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EQUINE AND HUMAN MUTUAL WELFARE: A WHOLE SUBJECT?

CRITICAL ASPECTS AND POSSIBLE STRATEGIES IN EQUINE-ASSISTED ACTIVITIES AND THERAPIES

Presentata da:
Dott.ssa Dora Maria Simona Li Destri Nicosia

Coordinatore Dottorato

Chiar.mo Prof
Eraldo Seren

Relatore

Chiar.ma Prof
Maria Laura Bacci

CoRelatore

Dott.ssa
Marthe Kiley-Worthington

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ABSTRACT:

General aim of the study is equine welfare, particularly concerning different husbandry methodic and inter-specific relational factors. Specific aim is the evaluation of possible mutual (to humans and to equines) benefits and the analysis of critical factors/strength points, of human-horse relationship within Therapeutic Riding context (TR).

The peculiarities of human-horse relationship (compared to the bond with "Pet") are analyzed, concerning their socio-anthropological, psychological, psycho-dynamic distinctive characteristics.

8 European representative therapeutic riding centers (TRC) were therefore selected (on the basis of their different animals' husbandry criteria, and of the different rehabilitative methodologies adopted). TRC were investigated through 2 different questionnaires, specifically settled to access objective/subjective animal welfare parameters; the quality of human-horse relationship; technicians' emotional experienced.

3 Centers were further selected, and behavioral (145 hours of behavioral recording) and physiological parameters (heart rate and heart rate variability) were evaluated, aimed to access equine welfare and horses' adaptive responses/coping (towards general environment and towards TR job).

Moreover a specific "handling-task" was ideated and experimented, aimed to measure the quality of TR technicians-horses relationship.

We did therefore evaluate both the individual horses' responses and the possible differences among Centers.

Data collected highlight the lack of univocal standardized methodic, concerning the general animals' management and the specific methodologies (aimed to improve animal welfare and to empower TR efficacy). Some positive and some critical aspects were detected concerning TR personnel-horse relationship.

Another experimental approach did evaluate the efficacy (concerning the mutual benefits' empowerment) of an "ethologically-fitted" TR intervention, aimed to educate children *to* and *through* the relationship with horses.

Our data evidenced that the improvement of human horse relationship, through structured educational programs for TR personnel might have important consequences both to human and equine welfare.

***RIASSUNTO*:**

Oggetto generale della tesi è il benessere del cavallo, particolarmente riguardo ai diversi sistemi gestionali ed alla relazione uomo-cavallo. Obiettivo specifico è valutare la possibile reciprocità (verso uomo e animale) degli effetti positivi della relazione, e analizzarne fattori critici e punti di forza nell'ambito della Riabilitazione Equestre (RE).

Sono descritte le particolarità (rispetto ai "Pet") della relazione uomo/cavallo, correlate ad aspetti del comportamento equino e ad interpretazioni socio-antropologiche, psicologiche, psicodinamiche.

Sulla base della loro rappresentatività (differenti metodologie riabilitative adottate e tipologie gestionali degli animali) sono stati selezionati 8 Centri di Riabilitazione Equestre (CRE) Italiani ed Europei.

L'indagine ha valutato: parametri oggettivi e soggettivi di benessere dei cavalli; la qualità della relazione operatori-cavalli; aspetti emozionali degli operatori.

Sono ulteriormente stati selezionati 3 CRE (in base alla diversità gestionale dei cavalli) ove sono stati misurati parametri di tipo etologico e fisiologico (frequenza e variabilità cardiaca), finalizzati a valutare il benessere dei cavalli; la loro risposta adattativa; la tipologia di coping al lavoro.

Gli animali sono stati osservati direttamente durante due distinte situazioni a riposo e durante le sessioni di riabilitazione equestre (per un totale di 145 ore di osservazione). E stato così costruito un etogramma dei cavalli ed analizzatene le risposte comportamentali/fisiologiche al lavoro.

Le valutazioni hanno riguardato la risposta dei singoli soggetti e la diversità fra i centri, correlabile con le diversità logistico-gestionali.

La diversità di fondo è stata correlata anche con diversità relazionali: infatti si è ideato e sperimentato un protocollo analitico di valutazione dell'*handling* da parte degli operatori.

I dati raccolti hanno permesso di identificare e misurare alcuni punti critici, ma anche alcuni punti di forza di questo particolare contesto, confermando le recenti acquisizioni sul benessere del cavallo e l'impatto su esse delle diverse scelte tecnico-gestionali.

L'ultima indagine intrapresa ha valutato l'efficacia di un approccio etologico alla RE, basato sull'applicazione di alcuni concetti di etologia equina (inerenti le dinamiche sociali equine).

Ad Oberlix

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INTRODUCTION

1.THE ANIMAL WELFARE QUESTION

1.1. ETHICAL, PHILOSOPHICAL AND SCIENTIFICAL BACKGROUND OF WELFARE DEBATE:

The debate on animal welfare can be framed in a most general subject that is the environmental question and the relationship between man and nature. During the last century a deep change of thought (the "new paradigm") has conducted from a mechanism and reductionist view to a systemic or holistic one. If the analytical and mechanism approach has emphasized the distinction between science and human values, the new paradigm highlights the connection existing between ethic and science. The ethic underling this new paradigm is a non-anthropocentric ethic, that acknowledges the intrinsic value of every form of life: all life beings are members of the same ecological community, they are related by a net of relationships.

The term "anthropocentric" refers to any view that regards humans as the most important and central being in the universe.

The assumption of human importance and centrality in the larger scheme of things has been widely accepted both by religious and secular views among Western culture: for most of the Western history the "moral status" of animals did not seem to be noteworthy and philosophers did not write extensively about it. On the contrary in some Eastern systems of thought historically animals are accorded a moral status and a great respect. The Jains of India, for example, hold that all life is sacred, drawing no sharp distinction between human and nonhuman life. They are therefore vegetarians, as are Buddhists (even if the underlying ethic seems to refer to the centrality of humans as well).

Historically the anthropocentric perspective is rooted in Aristotle's philosophy; western culture has been dominated by Aristotelian thought, based on the distinction between matter and form (physic and soul).The privileged moral status of humans is explained mainly by two characteristics: for Aristotle, and

for many other philosophers, the difference is that humans alone are rational; Christian faith added that only man is made in the image of God.

During the sixteenth and seventeenth century the scientific revolution due to Copernico, Galileo, Bacon, Newton was characterized by a mechanism approach to the live world; the scientific method assumed that we cannot be sure of anything until we prove it by empirical method.

It's philosophical base can be identified with Destarte's thought (what appear to be feelings in other animals is a mere illusion; the only thing we can be sure is our own mental existence, one could be not sure that anything at all existed until we have much more convincing evidence then our senses). Descartes argued a strong division between body and mind: humans have a mind because they have a soul, while others animals do not. Descartes thought constitutes an analytical approach: to understand complex phenomena we must analyze the properties of their parts. The ethic that underlines this thought is an anthropocentric ethic.

In Western culture a new debate on environmental and animal ethics developed at the end of the eighteenth century and during the nineteenth century. The utilitarian philosophy, led by Jeremy Bentham and John Stuart Mill, challenged the traditional exclusion of animals from moral concern. According to utilitarianism, morality is fundamentally a matter of seeking to promote happiness and prevent suffering. Bentham suggested that there is no reason to limit moral concern to human suffering and that disregard for animals is a form of discrimination analogous to racism.

Another important contribution was the publication of "On the origin of the species" (1859) by Charles Darwin, suggesting that men and apes are similar because they inherited many characteristics from the same ancestors. The differences that exist, according to Darwin's theory, are matters of degree, non of kind. It is during the twentieth century, and particularly in the last decades, that environmental and animal ethics have been widely studied and discussed by scientists, philosophers, moralists and theologians. The new ethic aims at the definition of a common area of conduct which identifies basic ethical principles acceptable by all components of the emerging modern global society.

This common background can be found in global well-being and in an environmentally sustainable development. Ecological knowledge of environmental processes and systems, and the perception of risks, caused by an ever increasing influence of humans upon their environment, have undoubtedly contributed to the growth of this interest. As regards animal ethics, the debate has been fed particularly by the publication of Peter Singer's "Animal liberation" in 1975, which stimulated a wide-ranging debate (Singer, 1975).

If the philosophers has concentrated on animal rights and on moral logic of animal welfare, scientists directed their attention on animal welfare question, first trying to apply the empirical scientific method to the subject of animal welfare. The two groups approached this task using such different concepts, assumptions, and vocabulary that they functioned as two distinct ''cultures'' with little mutual understanding or communication.

The result of these distinct approaches was a ***bridge*** between the two groups: where the scientists tried to find a scientific way to objectively measure animal welfare, and philosophers directed their attention on the subjective experiences of individuals (being the moral concern grounded, at least implicitly, on the idea that welfare is a state experienced by the animal).

Animal welfare science at its origin seemed to be affected by general suspect about animal minds. If, from a general point of view, moral concern for animal welfare is grounded on the idea that animals matter because they have experiences (Duncan and Fraser, 1997), when it came to study about what animal welfare was and how it had to be promoted, the issue of animal minds became more problematic to the scientists (Fraser, 1999).

In fact, most of the animal welfare theories did not include indicators about animal mental states. Some theories were focused on biological functions, some looked at behavioral preferences and others took natural (wild) conditions of life as the basic parameter (Duncan and Fraser, 1997). Of course, none of these approaches per se denied that animals have mental states. On the contrary, most of their supporters were persuaded that through those indicators animal mental experiences would be safeguarded. Though, animal

minds stayed in the background, because they could undermine the scientific reliability of the theory. If the moral logic of animal welfare were deeply mentalistic, its scientific logic tried to avoid too much concern for animal minds (*Rapporti ISTITISAN* 07/40).

But a reconciliation of the two logics actually is made possible by the **drastic shift of thought** that has involved first the physic science (quantum theory) and gradually is still contaminating the others sciences and, more generally, the whole social and cultural context. The "New Paradigm" consists in a new systemic (non analytical) vision: the attention is shift from the study of the singles parts to the study of the interconnections existing between them. This led to a greater awareness of the deep link existing between mind and physic. (Capra, 2005).

Therefore some studies in animal ethics created links with animal welfare science looking to empirical research to help resolve animal ethics issues. Some of these works expressed moral concern about animals using concepts that lend themselves to scientific analysis, recognized the importance of empirical analysis for discriminating between good and bad animal use practices. At the same time, animal welfare science has grown more compatible with the approaches used by some ethicists. Some scientists have recognized and tried to clarify the interplay of normative and empirical elements in the assessment of animal welfare, and many attempted to understand ethically relevant subjective experiences of animals. The increasing convergence of the scientific and philosophical approaches led to a **more integrated field of study** and to a greater awareness that neither empirical information nor ethical reflection could, by itself, answer questions about our proper relationship to animals of other species. (Fraser, 1999).

Animal welfare science became more concerned about mental state of animals and animal's subjectivity. Dawkins refers that the challenge of animals welfare science could be defined by asking three big questions: 1) Are animals conscious? 2) How can we assess good and bad welfare in animals? 3) How can science be used to improve animal welfare in practice? (Dawkins, 2006).

The issue of animal minds become a hot topic for animal behavior science and there was a widespread recognition of the 'sentience' of animals. The European Union officially recognized animals to be 'Sentient Beings' (Amsterdam Treaty, 1997). Sentience implies that animals:

- Are aware of their own surroundings
- Have an emotional dimension
- Are aware of what is happening to them
- Have the ability to learn from experience
- Are aware of bodily sensations – pain, hunger, heat, cold *etc.*
- Are aware of their relationships with other animals
- Have the ability to chose between different animals, objects and situations.

Animal minds then are not denied, but they could be rather different from ours; the problem is: how to read in other's mind?

Human beings seem to possess a powerful device to attribute mental states to other human beings and also to anticipate their behavior on the ground of attributed mental states. This capacity is usually labeled as *folk psychology* and it is the ability to explain and foresee others' behavior by attributing mental states (Meini, 2001). By the same capacity we can attribute mental states to non-human beings.

Actually, attributing minds to other living beings is an unreflective procedure. Before asking if others really have minds, we think and behave like if they had. In fact, during the evolutionary process, this kind of capacity has been rewarded, i.e. for its utility in developing anti-predatory strategies. Of course, the «innateness» of this capacity and its evolutionary success do not grant for the truth of the attribution of mental states, as they could not exist at all. Traditionally, attribution to non-human animals of human-like mental states has been labeled as a particular kind of mistake: *anthropomorphism*. (*Rapporti ISTISAN* 07/40)

The way we interpret animal minds however could be affected by a bias: our capacity of reading other minds is quite efficacious in the case of other humans, but when it comes to other species we cannot be sure of what other

animals' experiences are like. Notoriously, this kind of skepticism has been brilliantly formulated in Thomas Nagel's question «What it is like to be a bat?» (Nagel, 1974). How can we be sure to be able to know mental experiences of organisms whose brains, nervous systems and sensory apparatuses are different from ours?

But if we have good reason to be skeptical about what actually are animal experiences, we have also good scientific reasons to suppose that they should not be so deeply different from ours. At least, in the case of basic mental states (like primary emotions) we can suppose strong analogies between species evolved from a common ancestor. Furthermore biological correlates can prove similar mental activities in humans and non-humans (Griffin, 1992)**.**

Merging folk psychology and scientific evidences, we are not blind towards animal minds. In fact, anthropomorphism can be converted from a mistake to a critical method of enquiry and research. Conditional (or critical) anthropomorphisms is the term referred to this kind of approach, that can be seen as a step towards the reconciliation of the two logics of welfare, moral and scientific. (*Rapporti ISTISAN* 07/4099)

There is an *individual element* that has to be considered in welfare. Human beings reach their good life through a series of activity that are not represented by the basic needs of the species. Through their life, human beings try to develop a particular and individual style of life that is determined by personal preferences and individual character.

Introducing the individual dimension in animal welfare raises two questions. The first concerns the methods to recognize the particular and different characters of individual animals.

The second regards the strategies to promote the expression and development of individual characters and, so, of welfare in each of its components.

With regard to the first problem, useful hints come from methodologies aimed at qualitative observations of animal behavior.

The second question concerns the methods to satisfy individual needs. Given the individual nature of these needs, strategies must be elaborated case by case. The possibility for animals to express their character and to make their

capacities flourish is increased by the possibility to be inquisitive and manipulative toward the physical and social environment.

On this basis, individual animal welfare is promoted where animals are given the **possibility of choice** and to satisfy their needs the way they like most.

But what are these needs exactly?

Ethologists and experimental psychologists have shown that other mammals have **physical** needs and also **social**, **emotional** and **cognitive** needs. If mammals are to have a life of quality as well as one free of suffering, then it is necessary to fulfill all these needs. (Kiley-Worthington, 2010).

Animal welfare therefore is made of two levels. The first is constituted by species-specific needs that can be measured by objective lists, and promoted through standard actions. The second is made by the **individual** needs beyond the basic needs shared by all the members of a species.

Animal welfare science is therefore recognized as a multi disciplinary study, involving animal scientists and ethologists, wildlife and zoo ethologists, veterinarians, experimental psychologists, physiologists, anatomists, philosophers and cognitive scientists.

Considerable progress were made in our understanding and ability to assess good and bad animal welfare over the last couple of decades. We now also have more information on the different species needs, and we can therefore better design their environments to fulfill them. Progress in understanding learning in mammals, and more deepen information concerning **different species minds** (and their likely *points of view* on the world) still need to be carried out. Approaching animal welfare in a such comprehensive way may, perhaps, help humans **to increase not just the other's species welfare.**

1.2. HISTORY DEFINITIONS AND MEASURES IN ANIMAL WELFARE SCIENCE:

It is philosophers who have sparked off the serious thinking about animal welfare issues. The animal welfare scientists job is to try and accumulate evidence to illustrate whether the various views held by philosophers, and now the general public, are rational ones from the point of view of what we know about the animal concerned. But, remember that the scientist will also have views and never will his results ever be completely objective as a result! (Kiley- Worthington, 2010)

It is in UK that the animal welfare science found its origin: the first modern review of the problems of animal welfare was published by the British government in 1965 (Brambell Committee: Report of the Technical Committee to enquire into the welfare of animals kept under intensive livestock husbandry system. London, UK: Her Majesty's Stationery Office; 1965).
In fact the changing of human lifestyle progressively induced modifications in the husbandry and management systems, from rural to more intensive ones, till reaching the industrial husbandry systems widely spread up to date. These last systems and their possible consequences on animal welfare were denounced in a book written by Ruth Harrison (Animal machine) and published in 1964; the book generated so much public concern to stimulate the government to appoint a specific committee which result was Brambell Report.
The report declares that , in rearing animals, humans should take into account the following so called 'five freedoms':

- *from hunger and thirst*
  by ready access to fresh water and a diet to maintain full health and vigor;
- *from discomfort*
  by providing an appropriate environment including shelter and a comfortable resting area;
- *from pain, injury and disease*

by prevention or rapid diagnosis and treatment;

- *from fear and distress*
  by providing conditions and care which avoid mental suffering;
- *to express normal behavior.*
  by providing sufficient space, proper facilities and company of the animal's own kind.

The 'five freedoms', which were then drawn on by the UK's Farm Animal Welfare Council (FAWC), providing valuable guidance on animal welfare. They are now internationally recognized, and have been adapted slightly since their formulation.

But the problem was that this approach, although widely quoted, has had little, or no effect in helping scientists to make rational judgments concerning individual animal welfare.

Another approach was to assess whether the animal could "cope" (that is adapt) to the environment. The welfare of an individual is its state as regards its attempts to cope with its environment (Broom, 1986).

"State as regards its attempts to cope" refers to how much has to be done to cope and how well or how badly coping attempts succeed. When coping is difficult, or is not possible, this will often be recognizable by scientific study of the individual.

Animals may use a variety of methods when trying to cope. There are several consequences of failure to cope, so any one of a variety of measures can indicate that welfare is poor, and the fact that one measure is normal does not mean that welfare is good.

Broadly speaking, there are three instances that can be adopted when considering the animals' ability to cope with captivity. These are the naturalness of the behavioral repertoire, the biological functioning of the animal (its productivity and pathology) and its subjective state or feelings (Fraser et al., 1997):

1) Psychological/mental (feelings: evaluation of animal's suffering and preferences)

2) Physiological (evaluation of biological functions)
3) Ethological (comparing with natural behavior)

In the first case the level of welfare will be compromised by **subjective negative feelings** such as, for example, fear and frustration; conversely, experiencing comfort and pleasure will cause an improvement of the animal's state. The problem with this approach is that feelings, differently from other individual characteristics, cannot be observed directly, and are open to the observer's subjective interpretation. However they do affect the manifestation of certain behaviors: the use of conditional anthropomorphism might be helpful in this sense, even if differences in sensorial inputs may be relevant to emotional world of different species). For example, we are able to categorize certain type of behaviors belonging to the repertoire a certain animal species, such as certain displays of frustration-conflict, boredom, fear, anxiety, pain.

In the second case **physiological functioning** is purposed as a valuable measure of the degree of animal welfare. Therefore, disease, injuries and malnutrition will cause a decrease in the level of welfare, whereas growth and a good rate of reproduction will be the cause of a satisfactory state of welfare (Rapporti ISTISAN 07/40).

Measures of body damage are clearly relevant to welfare assessment. Susceptibility to disease is an important indicator of welfare. If animals are kept in such a way that their immune systems are less effective in combating disease, there is clearly some inadequacy in the management and housing system (Fraser and Broom,1990). One reason for impaired immune system function is chronic high activity of the adrenal cortex. Adrenal activity can occur during beneficial activities such as mating, but in general it indicates that the animal has some difficulty in trying to cope, so measurements of levels of adrenal products or of the activities of adrenal enzymes are useful welfare indicators (Dantzer and Mormue, 1979; Moberg, 1985). Coping includes normal regulation of body state and emergency responses, such as high adrenal activity, heart rate, or flight activity, which require more energy

expenditure and hence are used only when the animal predicts that normal regulatory actions will be inadequate.

Measurements of other hormones, enzymes, cellular mediators in body fluids give similar information. When animals are disturbed by a situation they often substantially change their heart rate in preparation for action, so heart rate measurement is also of value in assessing welfare. Another estimate of biological fitness is lifetime reproductive success.

On one hand, one of the advantages of this point of view is that it is easier to scientifically substantiate it than, for example, the feelings approach; on the other, the link between biological functioning and welfare is not always so clear. For example, an increment of the reproduction rate or milk production of dairy cows is not necessarily an indication of improved welfare.

Nowadays an integrated vision of the physiological response of organism highlights the relationship existing between different apparatus and organs, being try to identify stress' neural-endocrinal-immunological parameters, particularly in chronic stress (Psycho-Neural-Endocrinal-Immunology).

Finally the third instance argues that the more the animal in captivity is **behaviorally** different from the wild counterpart, the more its state of welfare is compromised. Therefore, animals in captivity should be free to perform their natural behavioral repertoire.

Obviously, in terms of the welfare of captive animals, this is a very appealing point of view, but it runs into conceptual difficulties. For example, the concept of "natural behavior" should be better explained. Moreover: is this implying that we should provide captive animals with aversive stimuli, such as the presence of predators or the conditions for social disputes, because these are integral part of their wildlife? Is this in contradiction with the very concept of welfare?

On regard to behavioral measures abnormal behaviors are considered. Abnormal behavior is *behavior that differs in pattern, frequency, or context from that which is shown by most members of the species in conditions that allow a full range of behavior* (Fraser and Broom, 1990). An abnormal behavior

might help an individual to cope, but it is still an indicator that the animal's welfare is poorer than that of another animal that does not have as much difficulty in coping. The more that such behavior pathologies are shown, the poorer is the welfare.

A stereotypy is *a repeated, relatively unvaried sequence of movements that has no obvious purpose, and the occurrence and causation of stereotypes has been the subject of much discussion* (kiley-Worthington, 1977; Mason, 1979, 1991; Broom, 1981, 1983; Dantzer, 1986).

Stereotypes occur in normal, healthy people at times when control over events is lacking, the person has a short-term problem and the stereotypy is evidence for this. People in solitary confinement in prisons show stereotypes, as do those with certain psychological disorders, especially autistic children. A person who shows a stereotypy on several occasions is considered to have some psychological problem, even if the stereotypy occurs at quite a low frequency. People take particular notice of someone showing a stereotypy, and there are some descriptions of zoo and farm animals also taking notice. It may be that some stereotypes help individuals to cope with their environment. Whatever their causation, stereotypes are shown in situations that are difficult, sometimes extremely difficult, for the animal, and so they indicate that the welfare of the animal is poor (Cooper and Albentosa, 2005).

Some individuals in close confinement show substantial activity, albeit sometimes rather abnormal, but others are inactive for long periods. Such differences are reported for human prisoners and mentally disturbed people. The two different kinds of responses are also apparent in situations in which environmental control by rats or tree shrews is severely lacking (von Holst, 1986). Prolonged inactivity has been described on various occasions in confined sows (Wiepkema *et al*.,1983). The behavioral response of becoming apathetic and shutting out most environmental stimuli is an indicator in pigs, as in humans, that the individual is having difficulty coping with its environment (i.e., that welfare is poor).

Apathy, unresponsiveness, hyper-responsiveness, abnormal and stereotypic behaviors could be explained as a sign of failure to cope with a poor

environment because of their deviation from normal, functionally adaptive responses seen in free-ranging animals. An alternative viewpoint is that these activities may have a function for captive animals as part of their adaptation to the captive environment; however although these responses may be an attempt to solve environmental deficiencies, their continued expression does not mean they are wholly successful compared with related activities that might be performed in the wild, and that the horse's welfare is ensured (Cooper and Albentosa 2005).

Individuals vary in the methods that they use to attempt to cope with a single environmental problem, and comparisons of housing conditions always involve several aspects that are potentially difficult for the animals. Hence, the measurement of welfare necessitates the evaluation of a range of indicators that must be combined in an overall assessment of welfare (Broom, 1991).
The WSPA (*World Society for the Protection of Animals*) resume this combined approach to animal welfare by the following assessment of:

1. Use the **Five Freedoms** as the **framework**
2. Assess welfare **inputs** and **outputs** ("inputs" are the factors that affect welfare; "outputs" are the actual impact of these factors on welfare).
3. **Quantify possible problems** using Severity, Duration and Number of animals affected.

Examples of three types of welfare inputs are:

- Stockman and handlers: Empathy, General attitude towards animals, Knowledge, Observation skills
- Environment: Housing, Bedding, Feed quality, Water provision
- Animal: Suitable breed, age and sex for the system.

Physiological measures of welfare include:

- Heart parameters and blood pressure
- Respiratory rate
- Neural transmitters and neural-mediators

- Immunological parameters
- Cellular mediators (cytokines)
- Enzymes and metabolites
- Adrenal habituation and others related hormonal levels

In 2008 UFAW (Universities Federation for Animal Welfare) called a meeting to discuss this. There was little agreement at the meeting, although became clear that it was now time to begin to measure positive responses to the environment.
Since evaluation of an animal's mental state is a critical goal for welfare assessment, considerations of both positive feelings (what an animal ''likes'') and resources that an animal is motivated to obtain (what an animal ''wants'') appear to be important. A review of current evidence suggests that positive welfare can be best assessed by evaluation of resources (i.e. inputs) that are valued by an animal and by positive outcomes such as behavioral responses, influences on cognitive processes and physiological markers. (Yeates and Main, 2008).

Therefore what by time appears clear is the importance of a combined approach, that should include *qualitative* and *quantitative* parameters and should consider both *input* and *output*, always *referring to the specific's and individual's* characteristics, experiences and needs. In order to reach the aim to ensure a life of quality and without suffering to the animals we care we must recognize their subjectivity and their mental attributes.

With regard to the aforementioned "input" I would like to highlight the importance to consider within the environmental factors two more items:

a. The possibility **to make choices**
b. The **occurrence of all the types of learning**

Moreover with regard to the animals what is important to consider is its individual past experience and attitude.

A possible example of this comprehensive approach in the evaluation of animal welfare is given by the analytical assessment of:

- *Physical or psychological signs of distress.*
- *The fulfillment of specie's needs in that environment.*
- *The fulfillment of the individual's needs in that environment (individual species needs may be changed as a result of the individuals lifetime experiences, and consequently this must be very carefully considered before a judgments is made).*
- *Measures of behavioral restrictions in each environment (this approach considers that all the behavior within the mammals normal repertoire has a function and consequently is import to them, so they should be able to perform them all, provided it does not cause suffering to others).*
- *Assessment of suffers when in contact with humans or during any form of teaching or working.*

  (Kiley Worthington, 2010)

2. EQUINE WELFARE

2.1. WHAT AFFECTS EQUINE WELFARE? SCIENTIFIC REVIEW:

Contrarily to many other domestic ungulates, which are mostly kept for zootechnical purposes, horses hold a *mixed status*: source of food for some, for leisure or sport for others or, less frequently, an agricultural working companion in rural areas (Edenburg, 1999). Recently emotional, educational and therapeutic consequences of the relationship with horses has gained a lot of attention; horses and horseback riding is getting very popular in therapeutic riding programs.

As we will discuss further the status of horse in the Western society is deeply changed during the last 40 years.
The husbandry conditions of domestic animals, such as of horses, has been deeply affected by the urbanization process.
Nevertheless many practical aspects in the horse's management are still kept ongoing: **traditionalisms** and **preconceptions** are deep-rooted among horse-people (we will evaluate further some psycho-sociological reasons for this phenomenon through the next chapter). **Cultural beliefs and habits**, rather than critical attitude and rational thinking, often determine in practice the husbandry, training, and general management criteria of horse in our society.

The judgments concerning horse's welfare is therefore often established on the basis of the aforementioned anthropocentric culture, that determines an ***overprotection*** at one side (the horse confined into "warm and aseptic" stables) or an ***utilitarian*** attitude (the horse as "competition-tool" to be used until he can compete) at the opposite side.
Hence the judgment on the "goodness" of stable and husbandry practices fulfill criteria that may not really match animal welfare.

In the last 25 years, with the proliferation of horses as companion animals a range of training methodic and "commercial gadgets" for training and husbandry has been developed, on the basis of the so-called "natural horsemanship" movement (fig.2.2 and fig. 2.3). They are however often more influenced by cultural attitude and beliefs to animal welfare, than by efficacy and humaneness (Goodwin *et al.,* 2009).

As above pointed out welfare science should be a multidisciplinary study, involving ethologists, wildlife ecologists, veterinarians, experimental psychologists, and cognitive scientists. Their job is to find out evidences in support or denial of the various views held by the general public (horse owners and horse professional people) as regards what is best for the horse health and quality of life.

The topic subject of equine welfare science, in agreement with what said about the animal welfare science in the last chapter, should therefore access both the *inputs* and the *outputs* of domesticated conditions.

It is to evaluate the physical and social environment as concerns the fulfillment of *physical, social, emotional, cognitive need* of the individuals kept in it (that is to measure the level of behavioral restriction-freedom in different husbandry conditions). It means also to access possible signs of distress (behavioral and organic measures markers of negative welfare) and to detect their positive outcomes, such as behavioral (*e.g.* play and affiliative behaviors), physiological (immunological parameters, simpatho-vagal balance) cognitive (e.g. different types of learning skills) markers of welfare (suggesting practical applications of possible **physical, social, cognitive enrichment**).

An evaluation conducted at Munich highlighted that among 3000 horses slaughtered 66% were between 2-7 years, and only 5% of them were specifically bred for slaughtering. The author suggests that behavioral problems would be the main cause of slaughtering for those horses (Ödberg, 1999).

The prevalence of stable vices in Canada was estimated around 15% between 1991 and 1998 (and it was highly related to management factors) (Leusher,

1998); among 225 Thoroughbred horses in UK 34,5% of them were affected by stereotypies (Waters *et al* 2002); in Italy among a sample of 650 horses 7% were affected by abnormal behaviors (Normando, 2002); in Australia respectively 32,5%, 30,8%, 19,5% of dressage, show jumping and endurance horses were affected by stereotyped behaviors (McGrevy *et al.,* 1995).
A recent online survey of horse breeders in USA, Canada, UK; Australia, mainland Europe (440 breeders at all), suggested that the overall numbers of horses showing abnormal behaviors may be declining, being the 5,2% of the sample.(Parker et al, 2008).
Another on line survey, conducted during 2009 to quantify the prevalence and type of handling and stable related problems within UK leisure horse population (1850 subjects at all) found that 82% expressed one or more of common behaviors problems, though the majority were scored as low intensity by their owners. Principle component analysis extracted five components: *handling issues* (57%), *frustration behaviors* (52%) *abnormal oral/ingestive* (48%) *aggressiv*e behaviors (33%) and *locomotors stereotypes* (22%) (Hockenhull and Creighton 2009).

The generic term "behavioral problems" includes those behaviors that could constitute a problem for the horse's owner; from a welfare perspective we'll indicate as "problematic" all those behaviors that decrease the quality of life of its performer (Cooper and Mason 1998).
The generic term behavioral problems includes therefore:

- normal behaviors that are unsuitable in the domestic environment (determining difficulties for the handling, riding or other domestic activities);
- behaviors that are the consequence of physical pain or organic problems (such us bucking while ridden, for back pain);
- abnormal behaviors that are the consequence of a form of psychological stress (Mills, 2001).

The latter (**abnormal behaviors**) are defined as "*behavior that differs in pattern, frequency, or context from that which is shown by most members of*

the species in conditions that allow a full range of behavior" (Fraser and Broom 1990).

They include apathy, unresponsiveness, hyper-responsiveness, stereotypic behaviors; they are a sign of failure to cope with a poor environment because of their deviation from normal, functionally adaptive responses (may have a function for captive animals as part of their adaptation to the captive environment; however although these responses may be an attempt to solve environmental deficiencies, their continued expression does not mean they are wholly successful compared with related activities that might be performed in the wild, and that the horse's welfare is ensured) (Cooper and Albentosa 2005).

Stereotypies are *behavioral patterns that are repetitive, invariant, and apparently functionless and purposeless* (Mason, 1991). The first research on stereotypies has been on children that grown up in institutions (Hutt and Hutt 1965). In horses they have been decrypted and they include crib biting, wind sucking, weaving, head tossing, head nodding (Kiley-Worthington 1973, 1983, 1987; Odberg, 1978; Mason, 1979; Nicol, 1999).

Other behavioral changes could include increased aggressions, radical change in the time budget (see fig. 2.1), developmental anomalies, significant increase in behaviors related to frustration and conflict, such as increases in behavior in origin related to locomotion (pawing, leaping, rearing, pacing), or skin irritation (head tossing, shaking, rubbing, chewing, scratching or licking self or object).(Kiley-Worthington, 1997).

All the "problematic behaviors" mentioned being the symptom of the lack of appropriate environmental conditions (human-horse relationship included), should therefore considered as welfare concerning questions.

1) Early management practices (during weaning) are universally recognized as one key factor in the development of abnormal behaviors (Waran *et al.,* 2008). In feral or free ranging conditions weaning is initiated by the dam at around 40 weeks (Duncan *et al.,* 1984; Crowell-Devis, 1986), while in domestic environment it abruptly occurs around 3-8 months, causing stress

to the foal that has been cited as a risk factor in the development of abnormal behaviors (Helesky *et al.,* 2002; Waters *et al.,* 2002). Important factors related to management pre-weaning and weaning practices may act influencing the development of abnormal behaviors.

These factors regard:

- intensive and invasive handling in the early periods of life, that may develop a sense of learned helplessness and subsequently diminish general level of activity (Hall et al, 2008);
- housing conditions;
- social environment;
- amount of roughage;
- access to free movement and to a complete (satisfying both physical and mental needs) use of the space (Hausberger *et a*l., 2008; Parker *et al.,* 2008).

Another important and often under estimated factor is the possibility to perform the strong inter-generational bonds that naturally occur in equine herd (Kiley-Worthington, 1987). Extensive as opposed to intensive management practices reduce the risk of foals developing abnormal behaviors; in addition an important factor in this sense is offering foals low energy forage in higher quantities instead highly palatable energy-dense feed (Parker *et al.,* 2008).

2) As concerns adult horses the same management factors seem to affect the husbandry conditions as risk factors for behavioral problems.

Particularly the **social deprivation** and the **spatial restrictions** experienced in conventional husbandry methodic seems to affect (as confirmed by physiological and cognitive parameters accessed) the welfare of horses (Rivera *et al.,* 2002; Sondegard and Halckoh 2003; Visser *et al.,* 2008; Cooper and Albentosa 2005; Hockenhull and Creighton, 2009) contributing to the development of behavioral problems such as becoming unresponsive and apathetic (Hall *et al.,* 2008), and therefore the quality of human-horse relationship (Hausberger *et al*., 2008).

3) Stabled horses are often fed **high-energy, low-fiber concentrates**, as this is a convenient means of providing horses with a finely balanced ration. However, the horse is naturally a grazer of poorer forages, often spending significant parts of the day feeding, and high-energy feeds require little time to process. In the stabled horse, a number of lines of evidence link stereotypic patterns of behavior, such as weaving and crib biting, with the feeding of concentrates (Cooper and Mason 1998; Nicol, 1999). Firstly, the feeding of high energy, low-fiber concentrated feeds without access to high-fiber forage is associated with a higher incidence of stereotypic activities in both epidemiological (McGreevy *et al* 1995; Nicol, 1999) and experimental studies (Gillham *et al.,* 1994; Johnson *et al.,* 1998). Secondly, the initiation of bouts of stereotypic behavior has been associated with feeding time. Thirdly, the development of stereotypy and, in particular, oral stereotypes has been associated with the provision of hard feed to foals around the time of weaning (Waters *et al.,* 2002).

Moreover others feeding-related problems (increasing in frustration behaviors and aggressive behaviors) during pre-feeding management routine (associated to others unwanted behaviors displayed in different time periods, such as nipping or searching clothing) seems equally related to **restricted access to forage-pasture** and inappropriate use of primary positive reinforcement (bad timing and consistency) in UK horses accessed through a internet survey. (Hockenhull and Creighton 2009).

4) If several studies has evaluated how different management practices affect equine welfare, others authors investigated how the **relationship with human** could contribute to enhance or reduce the quality of life of horses kept for different purposes.

In fact to the effect of management style (e.g. social and spatial restrictions in the most widespread case where horses are kept in a loose box) may be added the daily relation with human. Different caretaker (responsible of daily management routine for the horses) has been noticed clearly influence the

general attitude of horses, therefore constituting an important and often underestimated factor for the welfare (Hausberger and Muller 2001).

Moreover earlier negative experiences, linked to training may be added to the other factors and lead to chronic states where horses ''switch off'', becoming unresponsive and apathetic (Hall and al 2008), states described in humans in cases of work related burn out (Iverson *et al.,* 1998).

Another aspect of the interaction with humans regards the daily work. Interestingly, although time spent performing stereotypes increases with time spent in stall (McGreevy *et al.,* 1995), it may also increase with time spent working (Christie *et al.,* 2006).

Indicators are pointing to an association between stereotypic behavior and chronic stress; (McGreevy *et al.,* 1995) observed differences in prevalence of stereotypies according to the type of work, dressage horses presenting the highest prevalence. These differences were attributed to differences in management practices. However different riding styles may impose different ranges of physical and psychological stressors on a horse (Mills, 2005), that could explain these findings.

Differences in the emotional reactions of horses (outside the working situation) in behavioural tests were observed according to the type of work (Hausberger *et al.,* 2004). Dressage training, where horses have to perform restrained gaits and present a curved neck may have more physical (and psychological?) constraints than jumping, where horses are allowed more extended gaits and less pressure from the rider. A recent study showed that the ''rollkur'' posture (extreme neck curving) associated with some dressage practices was associated with more tail swishing, mouth opening and fear reactions than was observed in other horses (Von Borstel *et al.,* 2009).

Observations in their box of 76 horses, all living in the same conditions, belonging to one breed and one sex, revealed that the prevalence and types of stereotypes performed strongly depended upon the type of work they were used for (dressage-high school/ jumping-advanced riding school/ vaulting). The stereotypes observed involved mostly mouth movements and head tossing/nodding (Hausberger *et al.,* 2009). However it must be noticed that at

the work's constraints probably were added the unfavorable living conditions (housing in single boxes without any possibility of free movement or social relations; high concentrate feeding, food administered twice a day) furthering the emergence of chronic abnormal behaviors.

The effect of **different type of handling and riding** has been scientifically accessed during the last years. The primary goal, for those interested in equine training and learning processes, should be to maximize the potential benefits for both man and animal; however inappropriate training, riding and handling practices can lead to chronic conflict behaviors and affect welfare of human and animals (Warren-Smith and McGreevy 2008); furthermore it has been suggested that an alarmingly high wastage is arising in young horses from the inappropriate training and management (McLean and McGreevy, 2006).

Humans have regularly attempted to reinforce dominance strategies on the horses in their care in an attempt to elicit the desired outcomes and responses from the animals (Creigier, 1987). This may be a misguided strategy, given that the natural equine response to dominance is likely to be one of avoidance and it has recently been shown that training is actually enhanced when the training methods employed exactly match the mental ability of the horse (McLean and McGreevy 2004).

While their methods may not always have been based on scientific research, some informed trainers have highlighted the importance of a better understanding and appreciation of equine behavioral and learning processes (Roberts 1998). Given this raised awareness and apparent benefit, it is likely that learning behavior and the horse–human relationship might be aptly modified with the imposition of a better balanced social interaction between horse and riders/owners/trainers (Goodwin, 1999).

Recently different studies (Polito *et al.,* 2007; *Innes and McBride 2007; Keeling et al., 2009; Sankey et al., 2010; Fureix et al.,* 2009; Visser *et al.,* 2009) demonstrated that horses trained using a *sympathetic* method of training and handling (based on the attentive use of human-horse communication, on creating strong positive emotional bonds with the individual taught, on the

iterating of positive interactions), respect those trained and handled with traditional methods (based almost on punishment or negative reinforcement use) showed:

- a general lower reactivity (measured by both behavioral and physiological parameters);
- higher compliance and positive attitude (even towards unknown people);
- better technical performance less behaviors marker of frustrations and conflicts;
- more natural time budget.

  However it must be noticed that in many of these studies the training and handling methodics were paired with generally better husbandry and management conditions.

The neural mechanism by which **instrumental behavior is rewarding** is largely based on mesolimbic activity, i.e. dopaminergic input from the ventral tegmental area to the nucleus accumbens in the basal forebrain (Spruijt *et al.,* 2001; Boissy *et al.,* 2007). This system is activated during appetitive behaviour when, by the organism's own activity, a motivating goal is being approached and predicted (Martin and Ono 2000), independent of the specific kind of the reward. The refinement of behaviour during the behavioural shaping phase is reinforced by mesolimbic activity directed to the behavioural refinement itself, i.e. the reduction of the error relative to expectation (Schultz, 2001) and the following consummatory act.

Mesolimbic activation is rewarding by itself as indicated by numerous experimental studies which have demonstrated vigorous self-stimulation in this brain area (Fiorino *et al.,* 1993), corroborating the view that the activation of a neuronal network involved in the representation of successful approach to a rewarding goal increases experienced well-being. Hence successful instrumental learning activating the mesolimbic system can be an effective source of well-being for domestic horse.

This activation will be triggered by the increase of instrumental performance, that is **control over the task** and **prediction** of the reward (Manteuffell *et al.,* 2009).

Control, that is knowledge of the consequences of actions, is an important factor of welfare in horses kept in domestic conditions. Its loss has been convincingly detected as a major cause of distress (Bassett and Buchanan-Smith 2007). It is evident that this is of particular value if it relates to environmental factors for which salient motivations exist.

Important motivations are those related to maintenance, social and reproductive behaviors. However commonly in the domestic environment horses have really a few possibility of control: they are often kept in socially and physically restraints conditions (as regard food, shelter, use of space and movement, social inter and intra specific involvement). In traditional husbandry conditions in fact horse are kept in single boxes, fed twice or three per day, ridden or trained with methodic based almost on habituation, punishment, negative reinforcement. Even when positive reinforcement is used quite often it is not used properly and with awareness, so that its effectiveness is vanished (for lack of timing, consistency, innovativeness).

Based on broad experimental evidence (reviewed by Bassett and Buchanan-Smith 2007) the acquisition of control is a considerable enrichment factor.

Gaining control is tightly coupled with an increase in predictability enabling the animal to be prepared for the event. When talking about predictability the time-range of prediction has to be considered, however. If animals are not enabled to act quickly for being rewarded as expected, passive waiting for an anticipated reward (e.g. the horse that wait for his grains in his box) can be stressing due to **loss of control**.

It is surely different from the anticipation of a reward that can readily be achieved after an appropriate action. This latter type of anticipation, where reward is obtained after a short time while the animal is active in a goal-directed manner, can even increase the appreciation of the following consummatory act.

Learning instrumental behavior generally includes three consecutive phases: first, the detection of a discriminatory stimulus that is contingent to the primary motivating reward, second, shaping of behavior to get access to the reward, and finally complete control over the task. In the last two phases,

anticipating reward after appropriate instrumental behavior has a positive emotional effect.

Though the anticipation effect in the last phase is stable and requires attention to discriminate the occurrence of stimuli indicating the possibility of accessing the predicted reward the animals may eventually become 'over-experienced' so that a more or less automated reactive behavior may develop (Meehan and Mench 2007). Then, some new learning may be appropriate to sustain the positive effect of cognitive enrichment.

The traditional "horse culture" however taught that horse training should be based on repetitiveness and constancy. Moreover it has been demonstrated that farm animals "learn to learn", as they acquire new but similar tasks with an increasing learning speed while predictability becomes slightly reduced in order to keep some degree of ongoing challenge (kiley-Worthington, 2009; Manetuffel *et al.,* 2009).

All the aforementioned processes should be considered attentively, in relation to the cognitive under-stimulation that often is provided for young horses until they are trained and, later, considering the husbandry conditions and the training methodics.

Taken together, it is tempting to conclude that control and predictability may be improved considerably by settling appropriate teaching tasks and by realizing environmental facilities and husbandry conditions aimed to increase the control of horses on their domestic environment.

Attentiveness settled learning tasks and facilities may represent an important cognitive enrichment. However considering cognitive enrichment and welfare it is important highlight also the need for learning opportunities others than instrumental conditioning (such as *observational, social, cognitive or silent learning*) (Kiley-Worthington, 2005).

Providing husbandry facilities and criteria that permit adequate (for composition and constancy of groups) social experiences, *use of space* (as concerns quality and quantity of movement) and *time budget*, may let the horse acquire a large range of knowledge (ecological and psychological

knowledge) which could really be effective in terms of **cognitive and emotional enrichment of domestic life**.

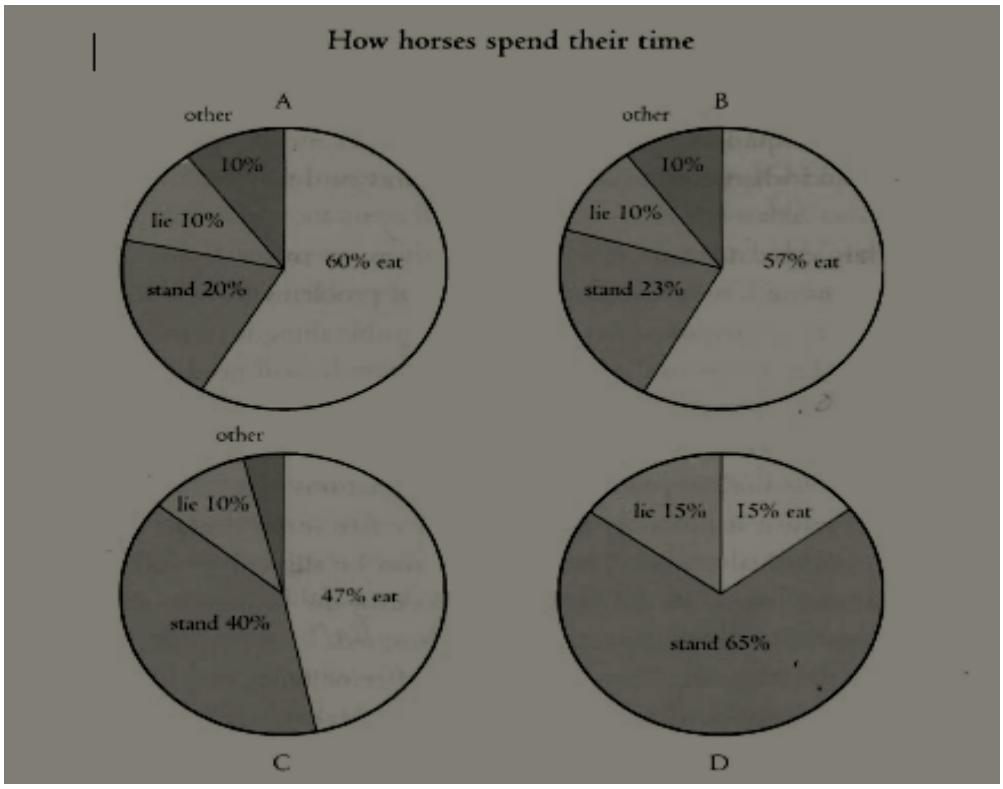


Fig. 2.1: *Differences in time budget between feral and domestic horses in different husbandry conditions: the yarded horses(B) could have appropriate time budget and their physical/cognitive needs being respected, if appropriate husbandry and relational criteria (working and handling) are attentiveness settled. A=Nature; B= Yard, in group, ad libitum hay; C=Individual stabled, can see and touch other horses, ad libitum hay; D=individual stabled, cannot touch each other, restricted hay. (from Kiley-Worthington, 1987)*

Furthermore it is important, to consider the importance of the emotional involvement with the teacher (built on the basis of the previous positive experiences and the empathic capabilities of the good trainer). In fact learning process involves an interplay of cognitive, emotional, physical events.

In the last decades many commercial purposes were created, to sell "ethological" training methodologies, tools, facilities. Some of them brought important contributes to change the common habits and traditionalisms of horse' owners; others, although inspired by willingness, were based on scarce effectiveness and balance between their costs and real benefits. (Goodwin *et al.,* 2009)

A rational assessment of these purposes should consider their consistency with the learning theory, all equine' and individual's needs (emotional, cognitive, social and physical), the equine cognitive abilities.

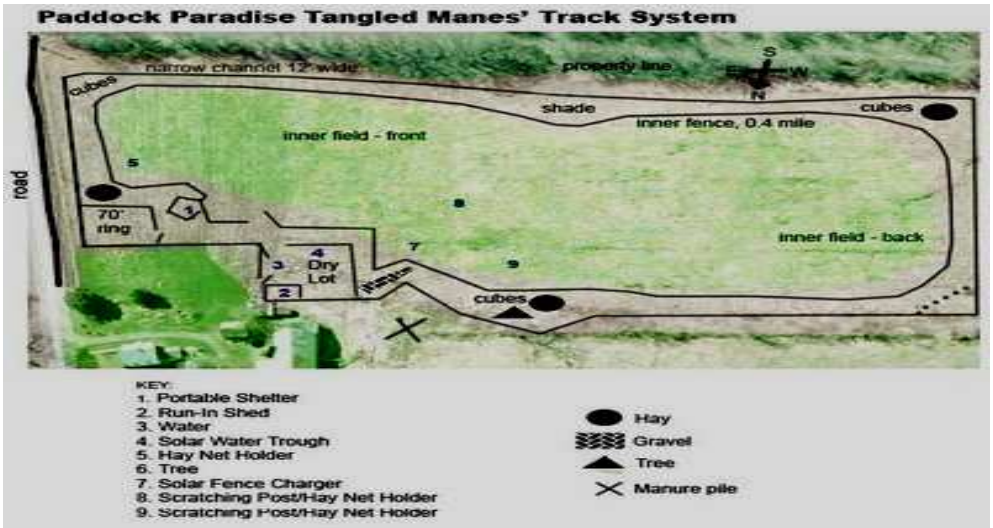
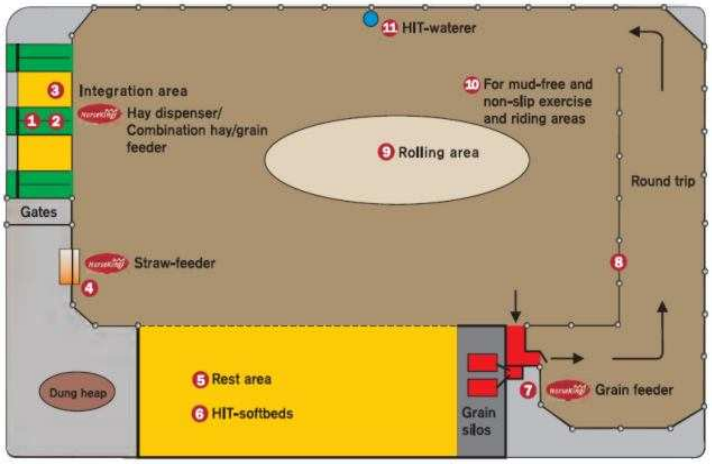


Fig. 2.2: *Paddock Paradise: it is a term to describe natural horse boarding, a concept introduced by Jackson in his book "Paddock Paradise: A guide to natural horse boarding. Star Ridges Pub." The aim is provide safe and effective living conditions, which use the horse's natural instincts to stimulate and facilitate movement and others behaviors. (http//en.wikipedia.org/wiki.Paddock Paradise)*

Fig. 2.3: *The HIT Active Stable, ideated to offer opportunities and arrangement aimed to horses' movement, rest, and cognitive/physical stimulation (http//aktivstall.de/e/products/etxtAktivstall.html)*



2.2. NORMATIVE AND LEGAL ASPECTS CONCERNING EQUINE WELFARE IN EUROPE AND IN ITALY:

The EU took initiatives to protect animals from the 1970s. The main motive was that disparities between national laws to protect animals could compromise fair competition within the common market (see introduction of Directive 78/923/EEC). The Amsterdam treaty (Anonymous, 1997) now recognized that animals are sentient beings and should be protected for this reason.

Conventions to protect domestic animals during transport, farming and slaughter were established by the Council of Europe and approved by many European states (Convention of European Council for the protections of companion animals, Strasburg 13/11/1987; Amsterdam Treaty on animals' protection and welfare, Amsterdam 16/06/1997).

Conventions are followed by **recommendations** that specify how the general principles of conventions apply for the different species. The European Union started discussions on animal welfare in the 1980s and adopted a series of **directives** to protect farm animals.

Both Recommendations and Directives define higher space allowance, more opportunity for social contacts, balanced diet, enriched environment, and limitation of harmful procedures.

Scientific reports (produced by committee ad hoc working) were produced on the welfare of farm animals during transport, slaughter, rearing (calves; laying hens; pigs; ducks and geese); use of somatotropin in dairy cows; broilers; fattening cattle; and fur animals.

According to the content of a report, DG-SANCO (General Directorate for the Health and Consumer Protection) may decide to draft a directive. A draft directive is submitted to the Council of Ministers of the EU and becomes a Council Directive only after receiving their approval. Some directives mention that after a certain time a new scientific report will have to be produced, and this can result in a possible revision of that directive.

To date, European directives have been produced which concern all farm animal species, during slaughter (Directive 74/577/EC replaced by Directive 93/119/EEC), transport (several directives, decisions and regulations from 1977) or rearing (Directives 78/923/ EC and 88/58/EC) as well as **specific animals' farming,** such as laying hens, calves, pigs. A directive for broilers has been proposed by the commission in 2005 and is now under discussion.

In general, the five freedoms (Farm Animal Welfare Council, 1992) guide the work of the EU.

The general trends of EU Directives for the rearing of farm animals are:

_ To increase space allowance per animal.

_ To permit interactions between animals, and hence to encourage group housing

_ To give more freedom of movement.

_ To provide animals with an enriched environment (e.g. furnished cages for laying hens, substrate for rooting to pigs).

_ To feed animals a regimen consistent with their physiological and behavioral needs (e.g. sows and gilts shall receive foods that are bulky in addition to being high in energy, veal calves shall not be anemic).

_ To limit painful intervention (e.g. tail docking and reduction of teeth in piglets is allowed only in cases of overt injury to sows or other pigs and after trying to reduce behavioral vices by other measures).

EU directives are translated into **national regulations** (e.g. decrees) before they can be applied to farms in each country.

The new European rural Policy (2007–2013) (European Commission, 2004) announced that direct payments to farmers within the EU will depend on farmers' following 'Good farming practices' that incorporate animal welfare legislation (cross compliance).

In parallel with the European legislation, all member states have their own national legislation. This legislation must at least conform to European

regulations but may also define more stringent measures. Animal welfare law varies across Europe with Northern states generally having the most stringent legislation themes.

Noteworthy specific dispositions regarding horse husbandry are not mentioned (contrary to other species); there are however specific directives about identifications and transport of horses (**REGULATION (CE) N. 504/2008; REGULATION (CE) N. 1/2005).**

The former concerns the identification of equines and their inscription in specific registers and into one of different sections (signaling the specific use of the horse); each animal is identified by a smart card and provided with a passport, a general distinction is made between horses bred for zoothecnical use (and then possibly intended for slaughter) and horses bred for sport/leisure (that never would enter into the food chain).

The latter defines the structural and hygienical conditions of the lorry, the space that each animal should have, the age allowed to be transported, the methodics that must be used to let the animals getting on and off, the maximum distance and time periods trips (9 hours).

The interesting things that should be noticed is that if out of doubt these regulations have an important impact on horse welfare, first of all they have been specifically and carefully established for their impact on economical and human public health concerns.

Then if accurate communitarians laws exist regarding some particular and circumstantiated situations of the equine life (transport, born and death), there is instead a deep lack of specific and detailed rules about the welfare of horses in relation to their husbandry and to the respect of their specific and individual needs by the daily management practices.

Nevertheless, to really understand how animal welfare is regulated in each EU country, we must look beyond the communitarians laws.

In the **UK,** for instance, the Parliament has published an **Animal Welfare Act** (Animal Welfare Act, 2006). An Act of Parliament is a 'primary legislation' that can enable the government to make 'secondary legislation'. The Animal Welfare Act 2006 allows the government to issue and from time to time revise

codes of practice. The main purpose of these codes is to give practical advice to owners and others responsible for animals on how they can ensure that their animals' welfare needs are met. Welfare codes for farmed animals have been in existence for some years. **Codes of Practice** generally aim at a higher level of animal welfare than is stipulated legally, and should be understood as a significant mechanism for a general increase in animal welfare standards across farms. Failure to comply with a code will not be an offence in itself. However, whether or not a person complied with a code could be used as evidence in court if a prosecution is taken.

A specific code has been established for horse (Code of Practice for the welfare of horses, ponies, donkeys and their hybrids, 2009, Department for Environment, Food Agricultural, UK).

The code is organized in a part that applies to environmental condition (size and management practices of pastures, yard, grouping stables, looses boxes), giving attention to the composition of groups and structural strategies, in order to avoid possible negative consequences of housing in groups. Another section is related to social and behavioral needs, while a further part provides detailed advices about other physical care (health management, foot care, feeding).

Noteworthy while detailed suggestions are given concerning structures and health care (with a particular attention to the proper feeding strategy, based on large amount of forage and aimed to prevention of frequent obesity and laminitis problematic), less accurate attention is paid on cognitive and social needs.

Although the code declares that "*Most stabled horses will benefit from daily turnout in the field to allow them to graze and socialize with other horses, this may have the added benefit of alleviating the risk of stable vices"*, nevertheless it further declaims: *"If turnout is not feasible, stabled horses should receive appropriate exercise daily, unless contrary to veterinary advice"*.

In fact the code, although judges as hopeful the husbandry based on pasture/yard, nevertheless admits, as a good practice, the loose box housing (detailed size of boxes are given), provided that the horse is given enough amount of physical exercise (even if it is provided by men through the work).

Similar judgments are given further: *"Horses are herd animals and prefer to live in social groups. Ideally they should be socialized with members of their own species but, where this is not possible, other animals may be used to provide company. They also enjoy human company so, if kept on their own, they require more frequent human contact and supervision"*.

Then the code admits as good practice to keep horses alone, provided they have other animals' company (even if it highlights that being kept with other horses would be better for horse).

Furthermore the code highlights the importance to look out carefully to the social composition of groups and suggests the strategies that should be adopted in order to avoid social conflicts and social lesions, specifying that: "*aggressive individuals may not be suitable for mixing in fields or communal barns. Incompatible individuals should be separated. These may include entire males (colts, stallions) and "rigs" (a stallion with undescended testicles). Given that stallions may not be suitable for turnout with other horses they may have special requirements and they should be provided with adequate environmental stimulation and movement*".

In relation to human horse relationship the code declaims: *"Horses require calm, consistent and sympathetic handling by competent people. Horses respond best to a firm but gentle approach. If you are unsure how to best handle your horse, advice should be sought from an experienced horse professional. Any restraint method used to assist normal management or treatment of the horse should be the most mild, effective method available and should be applied by a competent person only for the minimum period necessary. Sedatives must only be used if prescribed by a vet"*.

Finally recommendations are given about the duty of owners toward old animals:

"when a horse reaches the end of its active working life, or is very elderly, consideration should be given to whether the horse can be provided with a good quality of life in retirement; owners have a responsibility to ensure that they or whoever is entrusted with the care of such a horse is fully aware of the needs of that horse" and ethical principles are reminded about euthanasia:

"Where, in the opinion of a vet, a horse is significantly suffering, has not responded to treatment for a serious injury or condition involving significant pain, has a disease or injury from which there is no prospect of recovery and for which no treatment is available, or where a horse is in such a condition that it would be inhumane to keep it alive, the animal should be humanely destroyed without delay by a vet or a suitably qualified, experienced and equipped person, such as a knackerman. The horse's welfare must always come first. Therefore, in the interests of the horse, owners should give the issue their full consideration well before the time comes to make a decision to prevent the horse suffering unnecessary pain and distress".

In conclusion the main value of UK Code is its attention to most of the critical aspects that scientists identified as affecting the horse welfare in domestic environment. Nevertheless it should be noticed that it contains some contradictory or inconsistent aspects; furthermore while it does approach equine physical needs in a strict and consistent way it is not so rigorous with cognitive, emotional, social equine' needs and, above all, to transgress its principles doesn't entail any legal consequence itself.

Another interesting example of national law concerning equine welfare is given by the **Swiss code (Ordinance 23/04/ 2008 on animal protection).** The ordinance of Swiss Confederation in fact gives much more attention to the respect of a natural time budget and to the fulfillment of all the equine needs. The Swiss rule decides that particularly social and mental need (besides physical ones) must be fulfilled by providing at least twice a week (for horses that do not some work daily) or daily (for horses that do not do any work) *free movement in yard or, if it is possible, pasture*. Each put out on pasture/yard must be reported in a specific register. When special requirements do not allow to put out at pasture horses (for example for unfavorable weather conditions) it must be provided other sort of daily movement (it is possible only for a total amount of four week). For young horses it is required that they are kept in groups (to let them develop proper social skills and knowledge). The adult horses must be allowed to have at least visual, olfactory, acoustic contact with other horses. Moreover the horse-keeper are obliged to attend specific

educational courses (elementary course, for owners who own more than five horses and advanced course for those that own more than eleven horses). Nowadays the Swiss ordinance can be mentioned as the only European law that seriously concerns about all the needs of horses, consistently with the ethical and scientific issues reached on this item.

As concerns Italy so far there is a not a national law specifically established to enhance and protect equine welfare. The only laws are the European directives on animal welfare, acknowledged from Italian government, regarding transport, identifications, slaughtering. On the other hand in relation to the husbandry conditions of equines we have only local council building laws, that gives particular directives about the structural requirements.
Specific dispositions on equine welfare occasionally are established on the basis of the sensitivity of local administrations.
One example is the municipal ordinance belonging to the municipality of Monghidoro (a small town near Bologna). Interesting the ordinance regulates the requirements for horses establishing that horses, being social grazer, must be put out at pasture or into yards at least 13 days per week (even if they are ridden or if they do any other work); other detailed prescriptions are given on structural, environmental and health concerns. The provided for sanction is a fine (from 100 to 500 €).
A national juridical action, aimed to enhance equine welfare, is the bill presented by minister Rocchi and signed by other 82 deputies
The bill (**DDL** "**laws for horse protection**") recognizes the horse as a "pet" and declaims that
…….it is banned:

- Slaughtering horses that have been used for recreational, sportive, therapeutic, activities (and those used by police or navy).
- The weaning of foals before the 6th months of age
- Every mutilating surgeon
- Every coercive or traumatic type of training (and the "ethological" training should be advanced)
- Every kind of bridles that could create suffering in the horse

Every kind of experimentation on horse

……

The elderly horses must be provided of adequate housing and management conditions.

To prevent any wastage or any dangerous activity (detrimental to psyco-phyisical balance of the horse) all the displays, shows, competitions keeping with animal welfare laws must be banned

It is forbidden to organize races out of the normal recognized institutional circuit (UNIRE).

Furthermore the same minister that has signed the above mentioned bill (F Martini) has developed an **Ethical Code**, purposed to riders and horse workers. It consists in several points that resemble for their content and meaning the British Code of Practice (both in its qualities and faults); it represents a sort of ethical purpose, and it doesn't give particularly detailed practical measures.

In conclusion we can affirm that if welfare scientist during the last decades made important efforts to delve into what is to be an equine, what is his subjectivity and what his mental and physical needs are (besides the physical once), a certain distance still exists from the theoretical results of these researches and from their sociological, cultural, juridical consequences.

3.HUMAN-HORSE RELATIONSHIP

3.1. HUMAN TO HORSE RELATIONSHIP: sociological and psychological effects of horse on human

The horse is perhaps one of the most attractive animal and its figure had always populated human fantasy: images of horses appear in prehistoric European cave art at least 16,000 years ago, where an Ice Age artists painted a pair of horses in France's Peche Merle cave.

Although controversy surrounds when and where horses were first used to aid in transporting humans, it is well established that by 2000 BCE, horses were pulling chariots in eastern Russia and Kazakhstan, and between 2000 and 1500 BCE, horseback riding had become common in Afghanistan and Iran (Selby, 2009). It is indisputable that since horses were first domesticated, perhaps 6000 years ago, they have become inextricably linked with humans, and they have played a powerful role in shaping our history. The contributions that horses have made to human civilization are unequaled by any other animal. An important initial motivation for riding on the back of a horse seems to have been the advantages gained in war. For example, well before 1000 BC, the Persians were using horses and chariots effectively in wars against the Greeks, which encouraged the Greeks to develop their own cavalry. It is clear that the use of horses was often a pivotal factor in the outcome of conflicts at this time (Anderson, 1961). While there is no doubt that early horsemen were apparently skilled, their training methods may now appear unsophisticated and harsh. For example, Persian horse trainers strongly advocated using hobbles to restrain horses and prevent them from straying, and muzzles to prevent them from biting.

The earliest known text on horse training was written by Kikkuli in 1400 BC in the language of the Hittite region, which today stretches across South-Eastern Turkey, Northern Syria and Northern Iraq. Kikkuli was a master horse trainer

and wrote mainly about conditioning (fittening) Hittite war horses through exercise and feeding, rather than about the type of early handling or training used for breaking-in horses (Waran *et al*., 2002).
In 350 BC the Greek Xenophon wrote The Art of Horsemanship, in which he advocated what he considered to be humane methods of training, handling and managing horses. For example, he recommended that young cavalry horses should be trained by professional trainers, advised that foals should experience kind handling before being trained, and suggested that owners should keep a close eye on how their mounts were trained.
While Xenophon may have lacked specific knowledge of learning theory, he recognized the importance of a good human–horse relationship (for example, he stated that during the process of horse training, the horse should associate being alone with being hungry, thirsty or annoyed by flies, and the presence of a man with food, water and relief from flies).

In the last 40 years the social-economical status of horses is deeply changed. This is attributable to the industrialization and urbanization process that led to the loss of daily contact with animals. The relational aspects with animals has been therefore substituted with a mere visual experience, offered by the spread the media (giving often false and anthropomorphist visions of animals).
The lack of contact with nature (Louv, 2006; Wilson, 2007) and with animals become therefore an actual and important question and the relationship with animals acquire a value per se (Marchesini, 2005): the animal assume the role of *Pet*. However the bond with the horse should be considered as peculiar and unique, respect the bond with other household companion animals.

We'll report some of the conclusions of comprehensive study of the human-horse relationship social value, published in USA in the Journal of Business Research (Keaveney, 2008), adding besides some more personals or from others Authors reflections and perspectives.
The deepen study of Keaveney, moving from the economical concerns related with the equine industry, offers an accurate analysis of the peculiar bond

between horse and humans, conducted through a qualitative empirical study of humans and their horses (an on line survey).

In USA the horse industry impacts (directly or indirectly) on the economy for a total amount of 112 billion of dollars; in Europe it involves about 2.7 million horses and 5 million owners, riders, and drivers; with an economic impact counted in the tens of billions of euros.

An interesting enquiry concerning the perception of Italian people about the socio-economical role of horse, published by the Superior Institute for Public Opinion's Inquiry (ISPO 2009), reveals that in Italy at least 2,5 million people practice regularly horse-riding (and a further 10 million practices it sporadically).
The horse's social role is perceived by the 89% of the informants as important resource, for the exploitation of cultural and economical values (especially concerning the rural realities). Noteworthy 87% of the informants declared positive believes regarding horse, for his medical, educational, social potentialities.
Moreover 65% would purpose to their children horseriding (while respectively 17% and 15% wouldn't, for the risk or for the economical cost related to this activity); among them 46% advanced the relationship with horse as the first positive content of the horseriding.

Keaveney highlights how two phenomena, that help explain human attraction to household companion animals, anthropomorphism and neoteny, are present to a much lesser degree with equines (Grandin, 2005). Anthropomorphism, the tendency to project human characteristics onto animals, is more common among predators because each instinctively recognizes the meaning of the other's facial expressions, body postures, and even playful games (Grandin, 2005;).
Horses may also recognize such similarities, but react with fear when staring, sudden movement, or loud low voices remind them of their natural predators

(Roberts, 1998). Neoteny, a second path to human–animal relationships, is the "cuteness" factor. Selective breeding of canines and felines emphasizes those features considered "cute" by humans, such as floppy ears and big eyes, sometimes to the detriment of the breed (Serpell, 2003). Horses may be awesome, powerful, or beautiful, but they're not usually considered "cute," thereby also making them seem less approachable. In contrast to human, feline, and canine predators, horses are prey. The physiology of sensitive apparatus (particularly as concerns visual and olfactory stimuli detection) the prevalence of sympathetic nervous system and the morphological and biomechanical characteristics, are all characteristics that make the horse a flee strategy animal.

Unlike dogs who spend virtually all of their time with humans or in a human household, horses spend nearly all of their time with other horses. Through constant exposure and immersion, household-animal companions adapt to the human environment rapidly and almost subconsciously. The difference is not due simply to the physical separation of keeping the horse out in the pasture or at a distant location. Horses are herd animals: their primary attachment is

Keaveney concludes how, taken together, these underlying factors shape the **human–horse relationship** in ways that are **unique** to the two species and notably different from human relationships with house-hold-animal companions. Consciousness of imminent danger when around horses, combined with recognition that the horse thinks, perceives, and socializes differently, means that consumers of horse experiences are motivated and sustained by needs very different from the drive for a household-animal companion.

1) Shared themes with the pet-ownership expressed by the horse-owners are the friendship or companionship and caring and the common theme of emotional support and solace offered by the relationship with horse.

2) Themes with a twist (respect pet-ownership) are:

- the perception of the conditionality of love expressed by horse towards human: while dogs are defined un-conditional lovers horses are not supposed to express the same attachment to humans beings;
- the different physical display of affection: the horse cannot sit on laps, sleep together, or sharing the couch, nevertheless, like dog and cat owners, horse owners enjoy a physical as well as emotional connection with their horses. Grooming the horse means more to both horse and rider than just preparation for the saddle. For the human grooming the horse provides an opportunity for physical affection and bonding.

3) Themes that are news and unique of the human-horse bond:

- The first key theme unique and peculiar of the human–horse relationship is that ***riding*** a horse adds a level of physicality, intimacy, and intensity unique from anything experienced with household- animal companions. With training of both horse and rider, the horse translates minute movements in different parts of the rider's body into cues (or "aids"), which may be as general as direction and speed or as specific as which limb to move and how. Similarly, the rider interprets subtle movements in the horse's body as complex information about whether or not the aid was understood and executed. Cues can be so subtle that riders talk about simply thinking cues or sending thoughts, experiencing sometime the sensation of being "one with the horse" during the particularly good moments of a ride. The sense of unity seems shared by both horse and rider; surely, a horse finds it more pleasant to carry a rider whose movement is as fluid as her own.

- A second key theme is that the human–horse relationship is a ***working relationship***, where human and animal share the same goal, with mutual trust and respect. Horse owners believe that their horses enjoy their work, feel accomplishment and achievement, or feel joy in mastering a new skill.

Riders trust their horses with their lives. In return, the horse owners recognize that trust is a two-way street. Owners speculate that the horse trusts the owner to guide them both safely on a ride and to feed and care for him. Horse owners have a healthy degree of respect for the size and strength of the horse and therefore expect the horse to show respect for the owner the human trusts the horse to obey commands and be sensible.

- The third theme characteristic of human-horse relationship is the ***"bonding through the adversity"***. Heightened emotional arousal in the presence of danger creates bonds among humans. It also creates bonds between humans and their horses. A fascinating and unanticipated theme is that horse-rider bonds develop in the aftermath of getting through a tough situation together.

- The fourth theme reported by Keaveney refers to the spirituality underlying the relationship with horses and to the awe of its power and beauty. We highlights that this themes refer to the equine specific ***symbolic values***, that since the ancient ages has attracted and fascinated humans, becoming protagonist of mythologies and tales.

  A psychoanalytic explanation leads by one hand to magnificent aspects of the self (the horse as symbol of power, freedom, harmony), on the other hand it refers to the co-existence of conflicting aspects of the self (the dialectic relationship between instinct and rationality represented by the Centauries) (Sheidhacker, 1996)

- The fifth theme is ***feelings of sheer happiness and utter contentment that arise from total absorption in a challenging activity***, that are described by Csikszentmihalyi 1975, 1978, 1990 as a "flow experiences." In a flow experience, the individual feels "a contraction of the perceptual field, a heightened sense of concentration on the task at hand, a feeling of control leading to elation and finally to a loss of self-awareness that sometimes results in a feeling of transcendence, or a merging with the activity and the

environment" (Csikszentmihalyi, 1978, p. 219). Horse owners feel totally focused and completely in the moment when they are with their horses. According to Csikszentmihalyi (1978), activities leading to flow experiences include having a clear set of challenges, a special set of skills required to meet them, and unambiguous performance feedback. As with other high-risk leisure activities, the challenge is an essential part of the enjoyment. Unlike other high-risk leisure activities, however, success or failure depends on more than the competence of the participant and the integrity of the equipment. With horses, a third powerful yet unpredictable element is introduced. Most informants expend substantial effort to learn "horse language," on the ground as well as in the saddle, through some form of natural horsemanship training . A key part of such training includes reading the horse's natural body language (Parelli, 1993; Roberts, 1998). Such self-directed learning is intrinsically rewarding and contributes to the flow experience (Csikszentmihalyi, 1978).

Others Authors highlighted the fact that being with horses might lead humans to an expansion of the consciousness (by its being aware of the "whole" environment) and to a main self-awareness of the self (Kiley-Worthington, 2005).

- The sixth theme is the ***feeling of belonging*** to a communitas, that is an intense sense of community and belonging that develops when individuals share a common passion, devotion, or experience.

  However it should be noticed that probably a difference could be noticed among specific social contexts.

  In fact the Italian equestrian environment is deeply connected with the military tradition. Riding, after the war, was a privilege of particular social environments. This fact affected the mental attitude of its members (strictly tied to mannerisms and traditionalisms). This fact might be less accentuated or totally absent in different countries. In her study in fact Keaveney refers that *"a notable aspect is that the camaraderie that develops within the spirit of communitas transcends any external social*

hierarchy and crosses all walks of life. "Outside" social roles are not relevant and participants are free to develop new "inside" social roles". It seems therefore that social attitude among American "horse people" may be different than Italian or European one.

Anyway it is interesting report that in the last decades riding activities become more accessible and "democratic", and the recent enquiry conducted in Italy on 2009 reveals a more variegate landscape and a more spread diffusion of horseriding among Italians (ISPO, 2009), concluding that equitation isn't still a privilege (with its body of users calculated around 10 million of habitual or occasional riders).

- The seventh and final theme is that horses teach people life lessons, especially in terms of new ways ***to understand themselves and others***.

  As concerns this theme it seems to share with the fifth (defined previously as the "flow experience") the same possible psychoanalytical explanation, that could be lead by to his symbolic value, joint to his specific ethological characteristics (prey animal with particular social dynamics and particular communicative abilities). For the psychoanalytical interpretation of the relationship with horse the reader can see the next paragraph.

  In order to be able to reach any goal with animals in fact humans are obliged first to understand others' mind, and this experience is much more instructive as much different is the other (even if many similarities exists). In second instance human must become aware of his own emotions, feeling and reactions (Kiley-Worthington, 2004).

  If these aspect are typical of every inter-specific relationship in the case of equines they seems to be strengthened, for their ethological specific characteristics.

  Particularly the acuity in the recognition of visual-spatial cues and the capability to detect many different sensorial information at once; the rapidity of reactions; the physical strength; make the horse different from others animals and might teach humans to think and view

"differently"(Kiley-Worthington, 2005), expanding his consciousness and improving his balance and self-awareness.

Moreover the social dynamic of the equine group are based on the recurrence of cooperative behaviors and on the respect of the diversities among individuals rather than on hierarchical dominance dynamics.(Kiley-Worthington 2009). This fact besides having had important consequences on the modern training and teaching techniques, constituted perhaps the most important educative opportunity to human beings (Roberts 2002).

3.2. AAA /AAT: HISTORY, DEFINITIONS AND MEANING OF THE "THERAPEUTIC ALLIANCE":

The origins of horsemanship in a therapeutic context can be traced back to the Classical era, when Greek and Roman texts described the beneficial relationship between horses and people. Ancient treatises on medicine by Galen and Orebasius allude to the therapeutic effects of riding. Between 460-377 BC, Hippocrates included riding in a chapter on "natural exercise", and in 1569, Huronymus Merkurialis wrote "The Art of Gymnastics," which discussed riding and its beneficial effects on the restoration and maintenance of health. A more modern reference to the physical and emotional benefits of horseback riding can be found in the seventeenth century when Lord Thomas Sydenham, an early English physician, wrote in 1670, "There is no better treatment for the body and the soul than many tours each week in the saddle, riding the horse." In his 1875 thesis, the French physician Chassaigne recommended riding as a treatment for the improvement of deficits in posture, balance and joint movement manifested in some neurological disorders, and also noted the attendant psychological benefits of horsemanship. As a result of injuries sustained in World War I, soldiers returning to England were treated with riding therapy at the Oxford Hospital. However, the therapeutic possibilities inherent in horse activities came to the fore emphatically in 1952 when Liz Hartel of Denmark, disabled by the effects of polio, won a silver medal in the

Helsinki Olympics, the first Olympics in which women were allowed to compete in equestrian sports. Soon after, therapeutic riding increasingly began to be used for physical rehabilitation, predominantly in England, Germany and Scandinavia, and subsequently in North America (Selby 2009).

While comparatively little quantitative research has been published in peer-reviewed journals documenting the effectiveness of therapeutic interventions utilizing horses and other equines, there is a wealth of information available concerning the healing effects of therapy involving companion animals: On the animal-human relationship in fact are grounded those interventions aimed to the improvement of the quality of life or to therapeutic goals, through specifically planned and structured activities or therapies. These interventions assisted by companion animals are called **AAA** (animal assisted activities) and **AAT** (animal assisted therapies). Particularly noteworthy have been the work of Levinson in the 1960's. In 1962, Boris Levinson described the benefits of having an animal present during therapy sessions with some patients which he reported to have discovered accidentally when his dog Jingles enthusiastically greeted an allegedly treatment refractory nine-year-old boy, eliciting a positive response from the child. Bonding with companion animals has been shown to be a useful treatment alternative for people experiencing ,any different psychological disorders. Evidence has continued to accumulate, more rigorous controlled studies are being conducted, resulting in the emergence of a significant body of literature supporting the therapeutic value of the human-companion animal interaction. An article reviewing the benefits of animal-assisted therapy has even appeared in the prestigious Journal of the American Medical Association (Voelker, 1995).
Involving horses is different from the typical companion animal-human interaction in that horses are not predatory by nature as are dogs and cats, but are rather themselves animals that are preyed upon; moreover as already seen ***equines offer unique opportunities*** in the relational and therefore therapeutic process.

Some of the attributes that horses, as highly social animals, bring to the therapeutic environment are generally those of cooperation, patience, willingness.

The Federation of Riding for the Disabled International (FRDI) was founded in 1980 and is registered in Belgium as a non-profit organization.
Its mission is to facilitate the worldwide collaboration between organizations and individuals whose objectives are philanthropic, scientific and educational in the field of equine assisted activities. FRDI consists of The International Council, The International Executive Committee and The International Bureau.
In 1982, during the Hamburg International Congress FRDI have defined three different phases constituting the whole therapeutic riding **(TR)** purpose:

1. Hippotherapy;
2. Remedial and Educational Riding and Vaulting;
3. Sport and competitions.

Hippotherapy is a medically prescribed procedure conducted by health care professionals. The goal is rehabilitation through the motion of the horse; riding skills are not taught in classical hippotherapy, but may become an ultimate goal. Hippotherapy refers to a passive form of riding in which the client benefits from, but does not control, the movement of the horse. Riding skills are not taught, and often bareback pads are used instead of saddles so that the client can not only benefit from the movement, but also from the warmth, of the horse. Clients may be positioned astride facing forward or backward, sit sideways, or lie prone or supine. Ideally horses are long-lined, (or ground driven), rather than simply being led, to ensure as much straightness and correct movement as possible. Hippotherapy is not a distinct treatment strategy that is mutually exclusive; rather, it utilizes the movement of the horse with a variety of treatments such as the neurodevelopment approach, sensory integration, motor learning, motor control, and psycholinguistics to address neuro-musculoskeletal dysfunction.

The progression to the other two phases (remedial/educational riding and vaulting; sport) entails a more active participation of the patients, through the learning equestrian skills (related to the riding or to *on the ground* activities) and eventually through the participation to competitions specifically organized.

Rigorous research evidence has begun to accumulate, as illustrated by two systematic reviews (Snider *et al.,* 2007; Sterba, 2007) which demonstrated clinically significant beneficial effects of hippotherapy for children with cerebral palsy, and concluded that hippotherapy is a promising intervention.
Empirical literature is beginning to emerge in support of the **psychosocial benefits of the horse-human relationship**. Because Equine Facilitated Psychotherapy is just emerging as a viable adjunct to traditional psychotherapeutic techniques, the theoretical foundation of *why* and *how* it works are still in the early stages of formulation.

Modern Authors argue for a *nature-based therapy* as an antidote to the stress of modern life, and in the popular book Last Child in the Woods, Richard Louv (2006) describes what he terms "nature-deficit disorder" to account for many of the ills noted in modern-day American culture, particularly among children and youths. Wilson (2007) comments on his belief that it's strange indeed that psychologists have been so slow in addressing the mental health consequences of humanity's alienation from nature, given that our relationship to the environment is as much a part of our deep history as social behavior itself.
The dynamic interchange which occurs between clients and horses offers a dimension to clinical work which is not possible within the traditional confines of the office setting. Because horses are prey animals, their survival depends on their extreme sensitivity to the environment.
They are essentially *living biofeedback* providers because of their ability to respond to the emotions and internal states of those around them. Regardless of how much a person tries to disguise emotional states, horses ignore outward form and instead respond to inner substance. The horse's demands are relatively simple and uncomplicated, and conflicts are brief and few.

Psychosocial interventions involving equines concentrate on the social dynamics of equine behavior to help individuals recognize and solve their own problems while focusing on an external, sentient being, which helps to develop awareness of internal motivations and issues.
Horses are direct and honest in exchanges, whereas humans confuse and change the rules of social interactions through verbal communication. Horses have often been described as a "mirror" for human emotions and processes. Without self-constructed barriers, they help individuals learn to be congruent in their words and actions If a client is struggling with boundary issues and moves too close to a horse, the horse will take care to protect its space. Because horses are social animals, they have the capacity to teach social and relational skills because that is their basic mode of survival. They are also capable of communicating effectively and nonverbally the explicit message that "It might not be as bad as it must seem". Establishing communication with a species other than our own helps to develop skills that can be applied to cross-cultural communication, so important in an ever-increasing global economy.

Theories of attachment (Bowlby, 1958) and of neurodevelopment and cognitive development (Mahler 1978), have been suggested as applicable to the theoretical framework of equine-assisted psychotherapy: the relationship with the horse would constitute for handicapped people a *structuring relationship* helping to re-follow important developmental phases (Pasquinelli *et al.,* 2009).
The psychoanalytical interpretation refers to the symbolic value of horse and horse-riding as a practical way to experience an integration and harmonization of the instinctual and emotional part of self with the rational one (harmonization of sub-consciousness and rationality; *ego* and *es*): riding becomes therefore a metaphor of acknowledgement, acceptation and balance of our own oppositions and conflicts through triangular dynamics among horse-TR technician-patient (Pasquinelli *et al.,* 2009; Sheihdacker, 1996).

3.3. ETHICAL AND LEGAL ASPECTS CONCERNING ANIMAL ASSISTED THERAPIES in Italy:

The use of animals as therapists dates back to ancient times and is gaining more and more importance. The modern term "Pet Therapy" refers to the use of pet animals in the cure of specific disorders. These activities (more properly defined Animal Assisted Activities and Therapies AAA/AAT) are highly heterogeneous, both in terms of the professional careers of the operators, of the typology of patients and the modalities of intervention used. In Italy the increasing interest in Pet Therapy, and the lack of an ad hoc legislation, that might formally regulate the therapies performed with animals, has raised the need to document and regulate the activities that are being undertaken under this label. The ISS presented therefore a report collecting some data concerning activities and therapies performed in Italy with the assistance of animals: *Analysis and guidelines' purpose about animal assisted activities and therapies in Italy* (Rapporti ISTISAN 07/35, 2007).

Ethical issues are discussed and guidelines suggested to ensure health and welfare of all subjects participating in these programs. The above mentioned document in fact refers the Report produced from the national bioethics committee (CNB) "Bioethical problems related to the involvement of animals in human's health and welfare aimed activities" (CNB, 2005).

The National Bioethical Committee has been established in 1990, its duty is to evaluate ethical aspects concerning different environmental issues. The Committee, in charged by the council of ministers, has produced different reports concerning animal welfare: Animal experimentation and living beings' health (1997); Bioethics and Veterinary Science and Animal Welfare and Humans' Health (2001), Ritual slaughtering and animal suffering (2003); Bioethical problems related to the involvement of animals in human's health and welfare aimed activities (2005). Moreover the Bioethical Committee organized a Course on ethical aspects of these kind of activities (Rapporti ISTISAN 07/40, 2007).

The CNB, in the document of 2005 notably declares that must be ensured for animals involved in AAA/AAT a condition of welfare and a general enrichment of the quality of their lives, in all the different phases (included the end of their involvement). Therefore the Committee wishes the furthering of those scientific researches aimed to evaluate advantages and possible disadvantages arising from these activities, both for humans and animals involved. Particularly the report highlights the importance of the identification and evaluation of physiological and behavioral objective parameters, and suggests the use of training techniques defined as "gentle".

Moreover the Report declares that the dynamic balance between the different interests involved (of animals, of patients, of different components of the équipe) requires the participation of many different professionalism. The scientific findings about these issues might help to integrate the different areas of expertise and to work out possible tensions due to the difference in ethic and code of conduct of the different practitioners involved.

As concerns the role of the Veterinarian practitioner the Code reports as, in spite of the acknowledged vet's role related to animal's health and welfare, this goal was nevertheless targeted on human's interest, and only recently animal's interest was really directly considered. Therefore the role of the Veterinarian should be: to evaluate the suitability of the animal (both from the health and from the behavioral point of view), to preserve animal's welfare. Notably the Code highlight that *should be duty of the veterinarian to deepen his knowledge on the human-animal interaction issue, so that a general empowerment of the mutual benefits could be reached for both humans and animals*.

Moreover in the Document produced by the ISS (Rapporti ISTISAN 07/35, 2007) the preliminary results of an inquire performed by the National Referee Center for the study of Animal Assisted Activities and Therapies (AAA/AAT) are reported (Cirulli et al in Rapporti ISTISAN 07/35, 2007).

The inquire investigated the specific qualifications related to AAA/AAT and their professional background, detecting an heterogeneous composition (Educational Scientists, Psychologists , Sociologists, Biologists, Human Medicine Doctors,

Veterinarians, Nurseries, Psycomotricists, Physical education teachers, dogs trainers).

The study reports the great amount of different methodologies that reflects the great amount of different specific educational paths and the different professional background of the technicians. The authors conclude highlighting the need for a greater level of homogeneity and checks in this fields.

In conclusion generic guidelines, aimed to ensure the efficacy of the interventions, are given, by recalling the "good practice principles", based on:

- Interdisciplinariety
- Structured methodology (constituted by planning, identifications of generic and specific objectives, carrying out the results reached)
- Proper selections of the animals involved (by the evaluation of specific's, breed's and individual's characteristics)
- Respect of human health (veterinary checks aimed to reduce the risk of zoonothical diseases)
- Respect of the wellbeing of all the individuals involved (équipe, animal, patient), by constant monitoring of possible distress signals and following interruption of the activities.

Noteworthy all the documents above mentioned highlights as the base of AAA/AAT is the relationship with the animal. The human-animal relationship is defined as based on an interplay of emotional exchanges that follow the **acknowledge of the individuality of the animal**. The attitude towards this kind of therapy is then defined as possible stimulus to the process that is gradually leading to a **more human medicine concept**, that is based on the shift of attention from the sickness to the whole person (that is the *caring paradigm*).

Another important fact that should be noticed is that all the reports and documents mentioned make generally referring to *Pet Therapy* and to the specific problematic arising from the use of pets, without approaching the

different concerns related to the different species, included the particular horse's involvement.

As concerns juridical aspects in Italy there is a lack of specific laws on the use of animals in AAA/AAT. The only official act is the acknowledge of the therapeutic value of structured protocols based on the human-animal relationship (Decree of the President of the Council of Ministers, 28-02-2003, Acknowledge of the agreement on animal welfare and pet therapy; Published in: Gazzetta Ufficiale N. 52; 04 March 2003;).
As concerns Therapeutic Riding recently three different bills has been purposed to the Parliament (DDL n 482 / 29/04/2008).
The bills covers all the aspects that still lack: it recognizes Therapeutic Riding as possible therapeutic methodology recognized by the Department of Health and defines the requirement that the Centers should have to be registered (structures; insurance; required expertise for the technicians). Moreover a technical-scientific committee would be established, for the identification of the valuable methodologies and educational paths of the therapeutic riding technicians). The necessary professional figures required in the staff are:
one scientific overseer (a doctor properly specialized); one administrative director; one or more psycomotricist; one physiotherapist; one psychologist; one speech therapist; one or more assistant , one veterinarian, one riding instructor. The role of the veterinarian is to coordinate and to check all the activities linked with the keeping of animals.

3.4. NEW CHALLENGES FOR TR:

In Italy two main associations operate in TR sector and organize courses for technicians: ANIRE (founded on 1977) and LAPO (founded on 1993).
Noteworthy, in Italy, as concern the education of the technicians there is no distinction between psychotherapist or physiotherapist methodologies and the courses and diploma target both the related pathologies. Therefore, differently than USA, in Italian TR Center none distinction is done between these two main different target and the same center work indistinctly with the two different categories.
The situation is different in north America, where different Associations, education (courses for technicians) and methodologies are settled, and applied into separate Centers. In fact there is a clear distinction between neurologic/sensory pathologies and the psychological-behavioral ones (NARHA; the Equine Facilitated Mental Health Association EFMHA; the Equine Assisted Growth and Learning Association EAGALA).
If it is important, within an evidence based medicine, to evaluate separately the mechanisms of action and the effect of these interventions, it is also true that the target of every rehabilitative intervention should be always the *person*, globally evaluated and accepted.
in Italy in the past several attention and scientific studies were spent for neuro-muscoloskeletal pathologies' treatment, recently a new interest seems to be arisen (see Fise Congress organized at Rome and at Bertinoro on 2010 *ndr*) concerning equine assisted psychotherapy, even if a lack of clarity (about its mechanism of action and about its methodologies) still exists.
The reflection that spontaneously follow these evidences is that probably the "use" of horse for neuro-motorial issues might be less difficult than "involving" the animal in psychotherapeutic/educational activities.
This might be explained partially by the lack of scientific evidences/methodologies, and secondary by the fact that educational and psychotherapeutic intervention, being based first of all on the active and voluntary relational involvement of the horse, requires a strong bond of horses

with the TR personnel, and demands good skills and knowledge (concerning the general management of horses and their handling and teaching).

Noteworthy neither in Italy nor in other European Countries seems to exist univocal methodologies as concern the involvement of horses in therapeutic activities (selection, training, management).

Despite the acknowledgement of the importance of the relationship with horse, as primary focus of therapeutic alliance, scarce and fragmentary attempts are done to deal analytically with this subject and to answer to the question:

do exist a way to improve the relationship with horses, and is it possible to transmit these skills and knowledge to the technicians, to ensure more standardized methodologies and efficacy**?**

Neither has been seriously evaluated ***what (on the equine perspective) might affect or improve this process, eventually making really available to the patients the benefits of the relationship with horses*** .

As mentioned recently new perspectives and new challenges seem to be caught by some of the TR personnel and by the scientists involved in this important activity; new efforts and attention is paid to a modern rehabilitative approach, more in agreement with a more "human" medicine (that considers the needs and resources of the whole person instead focusing on his diseases).

3.5. HORSE TO HUMAN RELATIONSHIP: critical aspects affecting equine welfare in therapeutic and educational setting

Despite the body of studies concerning the effect of activity to humans there is still a lack of clarity as concern the outcomes for horses, and therefore as concern their welfare.

We'll report a critical review, concerning this subject (Li Destri Nicosia and Bacci 2009$_{a)}$).

While behavioral and physiological index of possible distress has been investigated, less attention is paid to the "productive" parameters, that in this

case may be identified as a complete and lasting fruition (by humans) of all the beneficial potentialities of the human-horse relationship.

Probably it depends by one hand on the difficult measure of these outcomes, by the other hand it might be related to the lack of real awareness of the whole effect arising through an active involvement of horses (rather than their mere instrumental use).

An interesting study published on 1999 (Anderson *et al.,* 1999) refers no statistical correlation among the evaluation of temperament expressed by TR technicians, the scores assigned through a reactivity test and the plasmatic concentration of cortisol, epinephrine, nor-epinephrine; even if there is a tendency to the correlation between the extremes reactivity scores and the hormonal concentration. This study conclude highlighting the need of collaboration between the TR technicians and the Veterinary technicians, aimed to a scientific evaluation of the animals attitudes (at the moment of horses' enrolment) and to e better definition of the best husbandry and training/management practices.

As concerns the behavioral evaluations some of the Authors registered the general behaviors of animals (in extra-job situations), referring to the variety, intensity, length and frequency of the different behavioral classes.

Others Authors evaluated specific moments during job activities, registering particularly the reactivity index towards fixed or variable stimuli.

Distress behaviors has been particularly targeted in these studies.

As concerns physiological parameters has been investigated the plasmatic cortisol, β-endorphins, Lymphocytic proliferation, Heart frequency. Noteworthy the parameters considered appear of scarce utility as concern the evaluation of chronic stress; moreover none of the studies report a long lasting screening of the animal's response to the activity or some index of their job-longevity.

A comparative study conducted by Italian researcher (Minero *et al.,* 2006) evaluated the reactivity (to a novel object and a restriction test) of jumping horses and TR horses through behavioral and physiological parameters. No difference has been noticed between the two groups. The only emato-chemical index that varied sensibly among the two sampling (before and after test

administrations) was the decrease of Lymphocytic proliferation after the restraint test. This data should be highlighted since the constrictiveness of TR job might contribute to decrease the welfare of the horse involved as chronic stress factor.

Previous studies of the same Authors highlights the different reactivity of horses towards different pathologies affecting the patients. Some stress related behaviors seems to be intensified with the furthering of therapeutic intervention, and therefore with a more active intervention of the children (during the progression from the hippotherapy to the remedial riding model) and with the stronger relational inputs directed towards the horse (Minero *et al.,* 2004).

Different conclusions are reported by Prof. McCabe (Suthers-McCabe, 2002) that conducted a research among 28 TR horses involved in sessions with different patients affected by different pathologies (psychiatric disease, psycho-social problematic, behavioral and emotional disturbs, neurological and sensorial pathologies). The behavioral observations and the cortisol plasmatic level in fact highlights the absence of stress symptoms in the general horses' response to the activities. However the Author refers that horses involved alternatively with different kind of pathological patients tended to perform worst response (both behavioral and physiological) during equine facilitated psychotherapy or educational interventions. The Author in agreement with the afore seen research identified the relational attitude of these patients as the cause of possible negative inputs to the horse.

Others Authors has investigated the possible differences related to the different therapeutic target (Kaiser *et al.,* 2006). In their study the Authors observed the response of 14 horses when ridden by different pathological or normal riders. No significant difference is reported among the different response in relation to the different groups of riders, even if a slight increase in stress display behaviors is reported when riders are affected by psycho-social problematic. The Author's hypothesis is that this kind of patients perform some negative relational modalities, perhaps for their instrumental vision of the horse.

In agreement with the others studies decrypted the Author highlights the importance to be more concerned about the management of the animals involved in the activities. In fact the horses might be unable of coping with TR environment, if are not settled specific management strategies.
In the case of the horses involved in this study they are referred do not work more than three days per week (with a maximum of three h per day); massages and ago puncture are provided during the rest-days to the horses. Moreover the horses are ridden constantly by qualified riders and have access to the pasture.

The foreseen studies converge therefore on the fact that the relationship in se might constitute a negative stimulus to the horse.
It seems that the modern scientific acquisitions about what might affect the equine welfare (analyzed in detail in the previous chapter) converge with the theme of TR horses welfare.
However it seems that some of the themes evaluated as concern equine welfare in this context might acquire much more importance, due to its specific characteristics.
In fact provided that all the general management practices were aimed to prevent the foreseen negative possible consequences of domestic environment (fed high-energy, low-fiber concentrates; restricted access to forage-pasture; social deprivation and spatial restrictions; loss of control and prediction and lack of cognitive stimuli and facilities aimed to the possibility of choice and of perform the different type of learning) would persist however some intrinsic stressing factors, connected with this specific job.
The TR context is characterized by the great number of people acting towards the animals (technicians, assistants, stagers, students, familiars or others that brought patients, the patients etc.) and by the different level of impact related to the different pathologies affecting the patients (rigidity, spasticity, sudden variation of postural tonus, lack of balance, abnormal relational attitude towards others people/animals or self-directed).

Moreover the repetitiveness and constancy of the setting (important therapeutic issue), the monotony of exercises and games requested to the patients, the high frequency/duration of particular constrictive moments (such as the mounting of particular disabled children) are all negative input that day by day might chronically affect equine welfare.

Furthermore it seems that some of the strategies adopted to prevent the possible burning-out of the animals refers to increase the time of rest and do not deal the real needs of the horse.

In this sense a great level of attention to the whole husbandry practice might be the first indispensable step aimed to equine welfare.

The second step might be to increase the quality of the relationship of horses with the people that day by day work with them (TR technicians). In fact improving the quality of their handling; teaching all of them the basic rules of learning theory; providing specific training task and facilities to the horses might contribute to an effective cognitive and emotional social enrichment useful to the horse's coping process.

Moreover improving the emotional experience of technicians while working and furthering their knowledge and skills might contribute also to increase the efficacy of intervention (for the patient) and might prevent the burning out of the technicians and an un-ethic and expensive wastage of animals.

The relationship with horses should therefore constitute a strength point, instead being a critical factor; this appear to be much more important in consideration of the fact that the TR activities are based on the relationship with horse, that should become an active component of the intervention.

4. PREVIOUS BACKGROUND AND PRELIMINARY EXPERIENCES AS CONCERN TR HORSES WELFARE IN ITALY:

Our study will include different qualitative-quantitative research-methods, that we'll examine further in the next chapters.

Their background is constituted by previous observations, that have been conducted particularly in one TR Center where we first experienced the TR reality.

This preliminary approach was made possible through the collaboration of:

the Veterinary technicians (in charge for animal welfare);

the others technicians of the Center, during their respective job (during a 7 years period).

These preliminary observations have been developed as "field-cases" (reported in some thesis degree: Facchini, 2000; Ridolfo, 2002; Li Destri Nicosia, 2003; Fratucello, 2003) that therefore were not settled as an experimental approach with strictly standardized procedures.

However they have been a first cue, that let us to shape our further scientific research, inspiring many of the ***"why"*** of the following studies conducted.

Our subsequent more analytical evaluations are therefore grounded on these preliminary experiences.

Moreover these preliminary experiences/studies have constituted a sort of practical guide-lines, followed to settle further some of the methodologies of the research decrypted in the following chapters (hence concerning many of the ***"how",*** aimed to answer the questions previously grown).

Moreover fundamental to the following research project is the theoretical literary background already discussed and the job experience (as welfare consultant and as therapeutic riding technician) within TR context.

We report three posters, that resume synthetically most of these above mentioned experiences (Li Destri Nicosia *et al.,* 2009 b; Li Destri Nicosia *et al.,* 2009 c; Li Destri Nicosia et al., 2010), and that might help the reader to better appreciate the context in which successive studies have been developed.

S 26/19 dora.lidestrinicosi3@unibo.it

ABNORMAL BEHAVIOURS IN THERAPEUTIC RIDING HORSES

D. Li Destri Nicosia*, S. Sabioni^, E. Facchini^, E. Ridolfo^, S. Cerino°, G. Giovagnoli°, M.L. Bacci*

*Department of Veterinary Morphophysiology and Animal Production - DIMORFIPA, Faculty of Veterinary Medicine, Bologna; ^DVM - pratictioner; °Italian Equestrian Federation- FISE, Roma; Italy.

INTRODUCTION

Therapeutic Riding (TR) is a global therapeutic method considering the whole person as a subject of the rehabilitation. Human-horse relationship is central in TR intervention. The horse becomes an active component provided that his features are recognized and respected. Nevertheless as reported in an our recent review, TR is recognized as source of potential stressors for horses.

The aim was the identification/characterization of abnormal behaviours in TR horses.

MATERIALS AND METHODS

- Questionnaires were sent to 45 TR centres in Centre-Northern Italy, for a first evaluation of the consistence of the problem.
- Preliminary direct ethological observation of four TR horses in one centre in Emilia Romagna has been conducted (along a period of two months).
- Further ethological studies were performed comparing three experimental groups (n=4): TR (A), destined to sport activities (B) and semi-wild breeding (C) horses. The subjects were observed 25 consecutive days, at fixed time (20 min, twice a day) and at random time (once every 3rd day) period.

A data sheet of behavioural assessment was utilised, to establish, through analysis of social and maintenance behaviours, the basal behavioural patterns of the subjects, respect to referring ethogram and in relation to different environmental conditions. Behavioural answers to variable and unforeseeable environmental cues have been noted too.

A tendency toward hypo reactivity with sporadic demonstrations of iper rectivity (particularly evident during some specific moments of acivities) have been noted. Inappropriate attitude of operators toward the horse is observable too.

Feeding and giving care are important activities to both the subjects of the relationship: it may nevertheless be a source of stress for animals.

MAINTENANCE AND SOCIAL BEHAVIOURS			
REACTIVITY		KINETITIC BEHAVIOURS	
Vocal activities		Type of Kinetic activities	
Reactivity to acustic or visual sudden cues		Times of exit from box	
Times and type of interactions with others horses		Times of put out to pasture or paddock and n. of animals in the same paddock	
Times of interactions with humans and their role (horse keeper, rider, groom, TR operators, patient, other)		Explorative behaviours	
Reaction to human transit (near box)		Use of space	
Reaction to horses transit (near box)		BODY CARE, RESTING AND SLEEPING BEHAVIOURS	
Reaction to others animals transit		Grooming activities (n. and type)	
Attitude at the entrance in the riding arena		Postures during sleeping, feeding, resting	
Attitude at the stair		Vet. Intervent.	
Attitude during stops in the riding arena		Farriers intervent.	
INGESTIVE BEHAVIOURS			
Composition			
Rationing, duration of intake, attitude during feeding			
Water assumpt.			
Others oral activities			

Data Sheet utilised for behavioural assessement, directed to formulate basal behavioral pattern of each animal

RESULTS

Preliminary approach highlighted a late identification of stress related behaviours; frequent onset of physical and behavioural problems (due to features of activities as repetitiveness, constrictiveness, interference with horse motor dynamics and as precariousness of human-animal relationship). Such conditions, however, were often under-estimated or not declared, until these compromised the use of the horses.

Further ethological studies highlighted a prevalence of reactive type anomalies (tendency toward hypo reactivity, with sporadic demonstrations of hyper reactivity) in group A; in group B, motor/oral-ingestive anomalies resulted more frequent. Group C didn't show abnormal behaviours and behaviours observed resulted more consistent (in quality and variety) with specific referring ethogram, in agreement with what already prospected from others author's studies.

DISCUSSION

Our results confirm previous observations and seem to reflect that specific and various stressors characterize TR setting, conflicting with horse's motivations and adaptive skills. These factors may determine the arise of disturbs related to a state of constraint or anxiety. Our achievements therefore highlight the necessity of animal welfare supervision by a vet and the request of more appropriate animal's management strategies.

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S 39/24 dora.lidestrinicosi3@unibo.it

MANAGEMENT OF THERAPEUTIC RIDING HORSES AND ANIMAL WELFARE

D. Li Destri Nicosia*, S. Sabioni^, S. Cerino°, G. Gi ovagnoli°, M.L. Bacci*

*Department of Veterinary Morphophysiology and Animal Production - DIMORFIPA, Faculty of Veterinary Medicine, Bologna; ^DVM - pratictioner; °Italian Equestrian Federation - FISE, Roma; Italy.

INTRODUCTION

The captivity contains many factors conflicting with horse's motivation and adaptive abilities. Some specific features of Therapeutic Riding added to such factors risk to compromise animal's welfare. Any defensive response towards stressors (organic or psychic) is expounded with a NEI (Neural-Endocrine-Immunological) response. **The aim was evaluation of the management strategy of horses in a Therapeutic Riding (TR) centre in Emilia Romagna that was finalized to NEI equilibrium of the animals.** The "Natural Management" was directed to create the possibility of expression of full consistent behaviors, the more possible consistent under each interpretative level (phylogeny, ontogeny, neural-endocrine, adaptive).

MATERIALS AND METHODS

Assessment of stress related or abnormal behaviors in TR horse (n=8) was conducted, by interpretation of postural and expressive signals of communication. Horses were involved in TR activities for an amount of 150 patients per week. The animal management was expressly predisposed to improve their adaptive possibility towards stressors related to their job for 2 years .

Natural Management was accomplished at different levels: feeding, nourishment, movement (quantity and quality), social environment, and it consisted in:

b) ethological management: it was based on use of communication, correct application of postural-expressive languages, learning theory and social motivation of the horse, inspiring the training of the animals, their eventual behavioural therapy protocols and housing criteria of animals.

c) functional trimming of un - shoed feet aimed to restore anatomical (vascular, nervous, corneas and connectivals) components, mechanical and biomechanical functions of equine foot (improved reaction to the floor impact, correct elaters of the foot, correct heel-landing, restored haemodynamic flow for the dissipation of energy and auxiliary circulatory pump).

a) natural diet for timing of nourishment, balanced composition (optimum hay, fat and oils with a good balance between ω_3/ω_6 fatty acids, low soluble carbohydrates intake, fruit and vegetables, healing herbs, dietary supplement) and correct posture during food intake.

d) correct equestrian techniques: constant training of animals aimed to psychic-physical relax and to improve gaits quality by a correct employment of dorsal and ventral muscular chains and by use of **harness not conflicting with equine biomechanics and physiology** (well-balanced saddles, use of bittless briddle).

RESULTS

Our behavioral assessment highlighted particular moments of activities most stressing for animals, and some features of the rehabilitative intervention particularly conflicting with equine physiology and biomechanics.

However those animals, under Natural Management strategy aiming at restoration of their physiological balance, have shown the possibility of expression of adaptive and functional responses, suitable with the TR activity context.

DISCUSSION

Our achievements suggested that Natural Management can be functional to the preservation of homeostasis.

More researches, based on objective parameters of wellbeing in relation to different management conditions, are requested: further parameters (endocrine, hematological, immunological parameters as expression of wellbeing of horses, in relation to different management conditions) are under evaluation and results should support our behavioral data.

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PSICOMOTRICITA' ED ECO-ETOLOGIA: ESPERIENZE DI UTILIZZO DEL CAVALLO NELL'EDUCAZIONE AFFETTIVO-COMPORTAMENTALE E NELL'INTEGRAZIONE SOCIALE DI BAMBINI CON DISAGIO

D. Li Destri Nicosia[1a], M.Tralli[1b*], M. Cadamuro[2*], F. Tozzola[3*], R. Rondinella [4#], ML. Bacci[1a]*

[1]Dip. di Morfofisiologia Vet. e Produz. Anim.- DIMORFIPA, Facoltà di Medicina Veterinaria;
[2] Psicomotricista; [3] Istruttore di Equitazione Paralimpica F.I.S.E.; [4] Medico Pediatra
*[a]Medico Veterinario; [b]Psicologo; *Associazione Gioconfà, #Associazione Un Cavallo Per Tutti; Bologna*

INTRODUZIONE

Il coinvolgimento degli animali in Attività educative, riabilitative o di semplice incremento della qualità della vita (le cosiddette AAA/TAA/EAA) prevede l'incontro di molteplici professionalità; comune denominatore è un approccio terapeutico/educativo globale, rivolto alla persona nella sua interezza.
Lo scopo è quello di descrivere una metodologia di lavoro con gli animali che consenta, tramite l'incontro sinergico di metodologie tradizionalmente distinte (psicomotricità, etologia apllicata, ecologia, equitazione), un più completo accesso ai potenziali benefici della relazione con gli animali e con la natura.
Tale metodologia di intervento verrà esemplificata tramite un progetto ormai decennale:
ATTIVITA' ESTIVE di integrazione rivolte a gruppi misti di bambini (normo-dotati e in situazione di handicap).
La proposta è quella di un soggiorno settimanale residenziale o semiresidenziale, nel quale la relazione con gli animali, letta in una prospettiva eto-ecologica, diventa il filo conduttore delle attività. Il metodo psicomotorio viene dunque rivisitato: esce dalla sala di psicomotricità per trasferirsi nel mondo degli animali e della natura.
L'attività iniziata durante le settimane estive viene poi sviluppata durante il resto dell'anno mediante INTERVENTI A CADENZA SETTIMANALE rivolti a piccoli gruppi di bambini, sia in risposta a situazioni diverse di disagio psico-affettivo che in un'ottica educativa e preventiva.

ECO-ETOLOGIA

Ogni essere vivente è inserito e si identifica in un sistema di relazioni complesse. La Gestione Naturale è una modalità di gestione dei cavalli (finalizzata al loro equilibrio psico-fisico) che prende spunto dalla complessità delle relazioni, sia fra i vari sistemi di regolazione dell'organismo animale sia fra questi e l'ambiente in senso lato.

La conoscenza delle **caratteristiche ecologiche, etologiche e fisiologiche dei cavalli e degli altri animali** è il nucleo centrale, sia nella definizione delle **metodologie** che dei **contenuti** degli interventi.

Le caratteristiche etologiche specie-specifiche, da cui derivano i particolari potenziali educativi/terapeutici nella relazione con il cavallo sono: la struttura e la dinamica dell'organizzazione sociale (basata sulla collaborazione e sulla valorizzazione delle diversità individuali); l'estrema sensibilità e finezza di applicazione dei canali non verbali di comunicazione (in particolare della comunicazione posturale ed espressiva); la grande tendenza reattiva e la prevalenza di strategie evitative.

PSICOMOTRICITA'

Il **gioco fantastico e simbolico**, il piacere del "libero **movimento**" il **raccontare e il raccontarsi** sono tutte modalità di espressione e di definizione di sé. Il percorso di crescita proposto si basa sulla possibilità **di *fare*** *e di conoscere e autoconoscersi* offerto dalla **relazione** con ciò che è ***diverso***.

Il bosco e la natura sono un luogo di avventure, di conoscenza e di ascolto, un luogo fantastico in cui creare delle storie in cui essere protagonisti, dove le emozioni possono prendere espressione ed essere vissute in maniera armoniosa e costruttiva

Il taglio psicomotorio delle diverse attività che proponiamo si basa su:

- la **definizione di un *setting*** strutturato, contenitore di emozioni
- la sperimentazione da parte dei bambini di alcuni ***momenti*** e rituali:

- **il tempo dell'accoglienza**
- **il tempo dei giochi di movimento**
- **il tempo degli animali e degli altri "*viventi*"** dove prendersi cura, ascoltare, ascoltarsi (anche attraverso l'elaborazione creativa della parte emozionale e simbolica), comprendere ed essere compresi
- **il tempo della rielaborazione** per permettere ai bambini di decentrarsi gradualmente.
- **il momento del saluto** un semplice strumento (video, foto, una frase o un oggetto ecc) per mantenere un contatto affettivo e che renderà chiaro che riconosciamo a ognuno il proprio spazio affettivo definito.

RISULTATI DEGLI INTERVENTI E PROSPETTIVE:

I progetti descritti hanno offerto ai bambini una concreta possibilità di crescita, di autonomia e di integrazione.
L'originalità dell'approccio realizza in pratica la possibilità di interpretare e dare risposta ai bisogni profondi del bambino in un percorso educativo (affettivo-emozionale; socio-comportamentale; relazionale; cognitivo; motorio-cinestesico) e riabilitativo che si rivolge in particolare ad alcune tipologie specifiche di problematiche (lievi disabilità mentali; disturbi specifici dell'apprendimento; disagio affettivo/psico-sociale; sindromi da ipoattenzione-iperattività). Le attività estive sono state, per tutti i bambini, un'esperienza non solo di divertimento ma soprattutto di crescita personale. La relazione con i cavalli e con la natura, la conoscenza delle loro regole sociali e delle loro modalità di comunicazione hanno favorito in special modo l'empatia, l'armonizzazione della personalità, la capacità di coesione e collaborazione.
Tale innovativa metodologia psicomotoria/eco-etologica apre ulteriori possibili scenari e sviluppi applicativi (nei reparti pediatrici ospedalieri, nelle strutture socio-assistenziali, nelle fattorie didattiche, nei centri estivi comunali, nelle scuole).

5. OBJECTIVES OF THE RESEARCH

HUMAN AND EQUINE WELFARE AS A WHOLE OBJECTIVE? EVALUATION OF THE SITUATION IN SOME EUROPEAN CENTERS:

In the previous chapters we approached the subject of equine welfare, through its underlying principles:

- ethics (non anthropocentric ethics, recognizing horse's subjectivity, and it's awareness, emotions, mind and need);
- scientific (evaluation of the individuals, of the inputs and outputs through qualitative and quantitative parameters concerning the individual and his whole environment);
- juridical.

We also evaluated how is changed the role of horse in our society, highlighting the acknowledgement of the relationship per se, as one of the most important value of animals (see the ISPO enquiry afore reported).
We analyzed the bonds between human and horses, describing in detail its sociological-psychological aspects; highlighting its possible beneficial effects, and describing also its possible risks for humans (prevalently serious safety issues).
We reported the modern acknowledgement, by the research, of several critical factors potentially affecting equine welfare, related both to the management criteria of animals and to possible negative effects of handling, training, riding.

Therefore we evaluated the particular case of TR horses, reporting the most recent acquisitions as concern:

a) the potential benefits arising from the bond with horse to the human beings;
b) TR context-specific critical aspects (as concern equine welfare) that might affect not only the ethic of animal's involvement, but also its

safety and its efficacy towards human's aims (reflecting its effects both on the personnel and on the patients).

The theoretical and literary background evaluated (and the practical situation described, as concern the organization of TR centers and TR technicians' education) seems to mirror the importance of being concerned about the whole management of the horses involved in this kind of activities, highlighting a lack of clear and univocal methodologies seriously and scientifically settled, persisting instead a set of traditionalisms and cultural beliefs, melted sometime with "romantics" and trendy commercial purposes (concerning training, tools, facilities), not always consistent with equine' needs and abilities.

Moreover we added to these evaluations the hypothesis that an improvement of the relationship between TR personnel and the horses, would contribute not only to animal welfare but also to the effectiveness of the interventions and to a full access to all their benefits for human beings.

The objective of this research is to compare these theoretical evaluations with the reality of the Centers.

The questions we'll try to answer are related to three orders of facts:

A. *Perceptions of TR personnel;*

B. *Objective parameters of equine welfare;*

C. *Possibility to increase the benefits (to human beings) by the improvement of human-horse relationship.*

More in detail the specific aims per each order of objectives were:

A.

1) The perception of TR personnel concerning equine welfare

2) The perception of TR personnel concerning their own relationship with horses

3) The perceptions of TR personnel concerning this job and in relation to several aspects:

- ✓ education received (concerning horses);

- ✓ emotional experienced (related to the different relationships acting contemporary, with others technicians, with horses, with children, with all the other professional figures);
- ✓ strength points/weak points and possible suggestions

B.

4) The detection of objective parameters of welfare of the horses involved in AAA/AAT

5) The identification of possible critical aspects affecting equine welfare in TR context

6) The analytical evaluation of the TR technicians-horses relationship

C.

7) The evaluation of the possible improvement in AAA/TAA' effectiveness, through a full access to the relationship with horses.

6.MATHERIALS AND METHODS:

6.1. HUMAN AND EQUINE WELFARE IN PRACTICE: ASSESSMENT OF EQUINE WELFARE AND OF THE HUMAN-HORSE RELATIONSHIP IN TR CONTEXT

6.1.1 SUBJECTIVE AND OBJECTIVES PARAMETERS THROUGH AN ENQUIRY CONDUCTED AMONG TR CENTERS:

Eight Therapeutic Riding Centers have been inquired, through two different kind of questionnaires: one addressing the Presidents of each center and one addressing every TR Technicians working in the Center.

We did accurately and specifically settled the questionnaires, through the previous knowledge acquired, concerning the critical aspects of the TR subject.

In 5 of the enquired centers the questionnaires were delivered administered and collected directly by the researcher, while in the remaining 3 the questionnaires were delivered and collected through the Web.

The questionnaires were aimed to answer the first orders of objectives (inherent the perceived welfare and the perceived relationship, by the TR personnel). Moreover the questionnaires were aimed to collect some objective parameter concerning equine welfare and the quality of human-horse relationship (second order of objectives).

Among the Centers involved 6 were Italians, one was French and one was Swiss; as stated with the responsible of the centers none information that might help to identify the single centers will be referred, neither will be reported the single affiliation of each center nor the education received by their personnel. The questionnaires' language was the Italian for Italian centers and English for the others centers.

The involved Italian Centers (n=6) were selected on the basis of their geographical position (one from South, one from Center, 4 from North Italy) and on the basis of their difference affiliation to different National TR

Associations (and therefore the different education of their technicians, and the possible different methodologies/approaches adopted).
These criteria of inclusions were aimed to cover all the possible differences existing among different approaches/schools, to have the most possible exhaustive outcomes concerning equine welfare.
Moreover two foreign centers were chosen (Swiss and French), to have a feedback from realities different than the Italian one. The total number of questionnaire administered to the technicians was 34 (n=34); the total number of questionnaire administered to the presidents was 8 (n=8).

1) PRESIDENTS' QUESTIONNAIRES

The questionnaires (20 items at all, part questions with multiple choice and part open-answer questions) were aimed to obtain some objective or subjective information about the centers and the horses:

1. INFORMATIONS ABOUT THE CENTER AND ITS JOB (7 items): The number of years they have been founded; the amount of job (n. of hours/week the center does work; number of patients attending the center) and its temporal distribution (during the week and during different periods of the year); the type of activities performed; the number of technicians or other figures that have been working with the horses.
2. INFORMATIONS ABOUT THE HORSES (10 items): Some more animal-related aspects, regarding the horses' management, and the internal organization of the staff and decisions making concerning the animals; the average age of the animals, the numbers of years they have been working within TR (defined as "work-longevity"); the number and time of rejection and it's most common causes.
3. PRESIDENT'S SUBJECTIVE PERCEPTIONS (3 items): The presidents' perception and believes about the use of horses in TR, and about the possible equine welfare problems as a result of job, about the utility to deepen personnel education concerning horses.

We report the original model of the questionnaire:

FOR THE PRESIDENT OF THERAPEUTIC RIDING CENTERS (TRC):

1. GENERAL INFORMATIONS ABOUT THE CENTER:

1.1 How long has been your association working?

(fill with[x] the answer chosen)

More than1 year **[ ]**

More than 5 years **[ ]**

More than 10 years **[ ]**

More than 15 years **[ ]**

1.2 Which has been the number of technicians working in the center during the last year?

…..

1.3 How many different people have participated to the activities with different qualification in addition to the technicians during the last year (voluntaries; stagiest; students; other)?

…..

1.4 Which is your body of users (number of children that attend to the activities every week)?

…..

1.5 How many days per week is the center opened?

…..

1.6 How many months per year is the center opened?

…..

2. GENERAL IN FORMATION ABOUT HORSES:

2.1 ***Please fill the following schedule with some information about the horses that actually work in your center***

Name, sex, breed, age, origin (possible last or still actual activities, if they are known), how long does he works with Therapeutic riding:

NAME of the horse	AGE	SEX	BREED	ORIGIN	NUMBER OF YEARS WORKING WITH TR
…….	…	…	…	….	……

2.2 ***The horses used in your center :***

(fill with[x] the answer chosen)

a) Belong to the association [ ]

b) Belong to others owners (eg riding school or other) [ ]

in case define which:

2.3 ***Which has been the minimum and the maximum number of years of a horse has been in your center? How old was he|she at the moment of the rejection? What has been the reason of the rejection? (please fill the following schedule)***

	Years of activity	**Age at the rejection**	**Reason for the rejection**
Minimum number of years used	**…..**	**……**	**……**
Maximum number of years	**…..**	**……**	**…..**

2.4 ***Which has been in your experience the most common reasons of rejection in TR horse?***

3. INORMATIONS ABOUT HORSE'S HUSBANDRY:

3.1 ***During the week the horses:***

(fill with[x] the answer chosen)

Work only with the TR activities **[ ]**

Work also with different activities **[ ]**

Please define which kind

3.2 ***Who makes the following decisions?***

DECISIONS:	**RESPONSIBLE:**
Choice of the horses	**…….**
Initial and periodical training	**……..**
Type of stalling	**……..**
Nutrition	**……**

3.3 ***In your operative procedures is provided some form of horse's screening about their responses to the TR activity? (fill with[x] the answer chosen)***

YES [ ] **NO [ ]**

- ***IF YES, PLEASE DEFINE***

Which of the following sentences better your situation concerning: a) it's modality b) it's timing:

a)

Is there one or more people responsible for screening the horses? **[ ]**

Or are all the technicians are equally responsible for the screening of the horses? **[ ]**

b)

Is there a specific time designated to screening the animal? **[ ]**

(Please eventually define which it is and what is his timing)

Or do all the technicians discuss the individuals **[ ]**

3.4 ***Which is the type of horse's stalling?***

(fill with[x] the answer chosen)

a) **Box** **[ ]**

b) **Box+paddock /or manege (horses do not have free access to their paddock but are brought into them, when the weather permit)**

[ ]

(Please eventually define how long per week during the different seasons):

……

c) **Box/stall communicating with paddock/pasture** **[ ]**

3.5 ***In the case a)***

The boxes have:

(fill with[x] the answer chosen)

a) **Complete partition** **[ ]**

b) **Half partition**

[ ]

3.6 ***In the case b) or c)***

the horses

(fill with[x] the answer chosen)

a) **Are in individual pens** **[ ]**

b) **Share the pen with other horses** **[ ]**

3.7 ***According to your experience do you believe that could be particular physical problems for horses involved in this kind of activities? And if yes of which sort?***

YES[ ] **NO [ ]**

3.8 ***According to your experience do you believe that could be particular behavioural problems for horses involved in this kind of activities? And if yes of which sort?***

YES[ ] **NO [ ]**

3.9 ***Is in your TR Center provided a common basical training for TR Technicians inherent horses?***

YES [ ] **NO [ ]**

- ***In case yes please define the type (eg. courses/up-to-date hold by technicians internal to the Center; Courses hold by external teachers; Training by Federal Horse Society or other Associations etc…….***

3.10 ***Would you be interested in countrywide qualifications for technicians doing this work?***

YES [ ] **NO [ ]**

2) <u>TECHNICIANS' QUESTIONNAIRES</u>

The items evaluated through this questionnaire were aimed to enquiry (through 56 items, mainly multiple choice questions):

1. SUBJECTIVE PERCEPTION OF TECHNICIANS CONCERNING HORSES: General and specific (in TR context) attitude and interest towards horses and perceived equine welfare (15 items)
2. OBJECTIVE/SUBJECTIVE PARAMETERS AIMED TO EVALUATE THE QUALITY OF HUMAN-HORSE RELATIONSHIP: possible perception or evidences inherent critical aspects or problems during TR sessions (25 items)
3. EMOTIONAL EXPERIENCED BY TECHNICIANS: General and specific emotional attitude; job-satisfaction level; group's dynamics, perception of training received adequacy (16 items).

As for the previous we report the original model of the questionnaires:

<u>FOR THE THERAPEUTIC RIDING (TR)TECHNICIANS</u>

1) The following questions are related to how you felt during the last year on regard to your job with the horses. Please answer to each question choosing the answer that is nearer to your case (make a sign inside the chosen case)XX

Chose a case per each line	**Certainly true (1)**	**Almost true (2)**	**Notalways true (3)**	**Almost false (4)**	**Certainly false (5)**
1) The horse could be an excellent therapeutic tool provided that has been well trained to obey to the orders					
2) The horse is an excellent relationships-mediator					
3) The horse is an excellent partner for human beings per sè (for his behavioral and physical characteristics)					

4) I trust only one (or more) horse(s), while I use the others only if I really need.					
5) Do you think that the demands of this job are acceptable to horses in general?					
6) Every horse in my Center is a good horse (provided that he has been coupled to the right child),					
7) This job could enrich the lives of people					
8) This job could enrich the lives of animals					
9) I would like to deepen my knowledge about horses					
10) I would like to improve my relationship with them and by this having best results and satisfaction in my job					
11) The most important focus is the human patient					
12) The most important focus is the horse					
13) I don't care about the horses: I trust who manage and trained them					
14) I would like to further the relationship with the horses I use.					
15) I would like to have with the horses used in my job a different sort of relationship (out of TR context)					
16) Often happens that I feel really relieved cause nothing bad has happened					

2) The following questions are referred to some problematic situations related to some behaviors of the horses that you used on the last year. Please answer each questions by choosing the answer closer to your case (make a sign in the chosen case)

How much the following horse behaviors have interfered with your job? Chose a case per each line	**Very much (1)**	**Much (2)**	**Fairly (3)**	**Slightly (4)**	**Nearly nothing (5)**	**Nothing (6)**
1) To walk on human feet						
2) Pull or push people						

3) To stop repeatedly and un-appropriately						
4) To threat people						
5) To threat other horses						
6) To attack people (kicks or bites)						
7) To attack other horses (kicks, strikes, bites)						
8) Sudden flight or jump						
9) To buck						
10) Lower suddenly the head						
11) Other movements with the head						
12) To refuse to go into the manege or to go out from the stable						
13) Un-wanted behaviors while getting on (to threat, to bite						
14) To refuse to stand (while getting on or other moments)						

Which is the medium amount of time spent handling during a lesson by the patient(the question is referred to a type-lesson, leaving apart from the different kind of problematics and from particular casuistry) *(to fill with a [x] the chosen answer)*

0%-5% **[ ]**
Up to 25 % **[ ]**
Up to 50% **[ ]**
More than 50% **[ ]**

3) Which score would you give to the following aspects (as concerns their relevance in term of safety and rehabilitative effectiveness)?

Chose a case per each line	**Very much (1)**	**Much (2)**	**Fairly (3)**	**Slightly (4)**	**Nearly nothing (5)**	**Nothing (6)**
1) I use for the handling only some of those available (while I do not use the others cause they do not tolerate it or I don't trust them)						

2) *Setting* properly prepared (more predictability and constancy of physical and human environment)						
3) Physical-control tools: to work with horses enough tightly restraint or tied up, if the horse is free to make sure that there are appropriate safety measures (fences, walls etc)						
4) Physical neighboring between the operator and the horse (to physically intervene if necessary)						
5) Use of the voice to point out to the horse the requested and the unpleasant behaviors)						
6) Use of expression and posture to point out to the horse the requested and the unpleasant behaviors)						

4) Please answer the questions giving a score to each :

Chose a case per each line	**Very much (1)**	**Much (2)**	**Fairly (3)**	**Slightly (4)**	**Nearly nothing (5)**	**Nothing (6)**
1) Have you been informed about the best way to enter into relation with the horses that you are using?						
2) Are you satisfied about the mutual understanding with horses?						
3) Do you think that there is enough consistency of conduct among the staff in regard to the use of the horses?						
4) Do you think that the training that you have had about the involvement of the horse in TR is enough?						
5) Do you believe that the involvement of all the operators on regard to the items related to horses is enough?						
6) Do you believe that in your staff the level of collaboration and exchange is enough?						
7) Do you consider to be satisfied about the goals obtained in your job during the last six months?						

8) Do you consider to be satisfied about your job in general (economically too)						
9) Do you think that your staff judges positively your job?						
10) Do you think that the husbandry of the horses used in your center is appropriate to their needs?						
11) Do you believe that the level of safety and rely of the horses in your center is convenient for their job?						
12) Do you think that the horses of your center are contented?						

5) ***During the last year how much your emotional state has interfered with relationship with the other TR Technicians?***
(make a sign inside the chosen case)

Nothing at all (1)	**Slightly (2)**	**Fairly (3)**	**Much (4)**	**Very much (5)**

6) ***During the last year <u>how often</u> did you note the following problems due to particular emotional state (such us feeling <u>anxious, untrusth, frightened, unmotivated</u>)?***
(make a sign inside the chosen case)

Chose a case per each line	**Always (1)**	**During the main part of the time (2)**	**Sometime (3)**	**Nearly never (4)**	**Never (5)**
1) It has shortened the amount of time spent for my job					
2) It has lowered the quality of my job					
3) I have had a reduction in my power of concentration during job					
4) To think that I could empower the results of my job					
5) I felt that it has caused to me an extreme and wearing mental effort					

7) ***As concerns your experience do you think that there are some particular <u>moments</u> or <u>type of activities</u> more invasive for the TR horses?If yes could why do you think so?***
8) ***Have you any suggestions on how to improve what we do for both the patient and the horse?***

6.1.2 FURTHER PARAMETERS FOR THE EVALUATION OF EQUINE WELFARE AND HUMAN/HORSE RELATIONSHIP IN THREE SPECIFICALLY SELECTED CENTERS:

We selected three of the enquired centers (**C1;C2;C3**), on the basis of their different criteria of management of the animals (concerning husbandry/management of horses).
These Centers, on the basis of the amount of job yearly performed, were classified as medium/big. Of the three Centers one was French, while the others were from the North of Italy.
We reassume the main descriptive characteristic of each center in the following paragraph; to get some more further information the reader might read the results of President's Questionnaires at the end of paragraph 6.1.2.

Brief descriptions of the Centers: Animals and husbandry methodic

1) The first center **(C1)** works with TR since 6 years. 6 ponies are used within TR projects (3 females and 3 geldings); they are kept within a 9 horses' herd (consisting of 7 Shetland ponies one Fjord and one Arabian horse). The average age of the TR horses is 17 ± 3,69 years. The property of all the horses is of center.
   The horses spend the night and part of the day in a big yard (around 1,5 hectare large), two open shelter are available in the yard. Moreover horses are brought out at pasture during pauses from job, during variables period (between 0,5-2 hours/day). They are fed hay twice. None grains nor concentrated food is fed (being the ponies defined as "easy keeper"). The horses are regularly provided with the necessary Veterinary cares, and their feet are trimmed around every two months (through a functional-trimming methodic). The ponies are mainly rescued ponies, with a common past of cruelty and ill-treatments. The responsible for the re-training and the general management of the animals is a TR technicians, riding instructor and specialized in

"ethological riding methodologies" (diploma issued from the French National Equestrian Federation). The ponies work both within TR and within pony-club activities, in fact the center is specialized in educational/leisure activities for really young children (between 4 and 10 years old), and different activities are performed, mainly targeting small groups of children through the involvement of horses and their environment (not necessarily based on the riding but on the relationship with the horses).

2) The second Center **(C2)** works within TR since 15 years, the therapeutic job is performed by 7 horses (2 females and 5 geldings); the average age of the horses is 14,6 (± 4,4). Within the center are kept 9 horses at all; the property of 4 of the horses is of the Center (named 1, 3, 5, 7 in our research), while 1 is of the riding instructor (this horse is not included in the experimental group since he does not work with TR) and 4 horses are lent from a riding school, which takes them back only for July and August activities (1 is not included within TR activities and therefore was not included in the experiment, while the others are named horse 2, 4, 6). Horses are kept in looses box during the night, while during the day (provided that climatic conditions were not too bad) they are kept in individual bare paddock (around 40 m^2 large). Horses are fed hay in the morning and in the evening, at lunch they are fed with pellet hay. One of the TR technicians (a riding instructor) is also the responsible for the training of horses, but this activity is not structured nor is provided a constant/periodic training-retraining of animals (the instructor rides or lounges sometime some of the horses that he believes might need it). The horses are regularly provided with the necessary Veterinary cares, and their feet are shod by a professional farrier, around every two months. Horses works both within TR and within the riding school. The activities performed are mainly based on the riding, even if sporadically educational activities not based on the riding are organized.
3) The third center selected **(C3)** is located inside a heal-residential institution, where mainly psychiatric adult patients are recovered. In the

structure a therapeutic farm has been settled (where Pet Therapy, occupational therapy and Therapeutic Riding are performed). The farm owns four horses, three of them (3 geldings average age 11 ± 4,3) were object of the research (one was not included, since she did not work, being too old). The horses are kept in individual yards, smaller (around 40 m^2) during the night and in larger yard during the day (respectively large around 40 m^2 and 200 m^2). Between one yard and the other there was a corridor (large around 2,5 m), so horses couldn't touch each other. The horses were fed hay three times per day. The horses work with the patients from the clinic and with external patients too; sometime activities with the schools are organized. The horses therefore work mainly with therapeutic activities. Horse training is not structured and constantly provided, being the horses only sporadically ridden by the TR technicians.

The horses are regularly provided with the necessary Veterinary cares, and their feet are shod by a professional farrier (two of the horses) or trimmed by the same farrier (one horse), around every two months.

3) <u>ETHOLOGICAL EVALUATIONS DURING PRE-MEAL/REST</u>

Thirty minutes animal-focal samples were continuously recorded (through direct observations) at fixed times, during two different time periods:

1. around 30 min before the meal (***PRE-MEAL*** *OBSERVATIONS*);
2. at least 1,5 h after the meal (***REST*** *OBSERVATIONS*).

The recordings were done between 7 am and 7 pm.

All the horses kept in the Center that were involved in TR activities have been object of this first ethological evaluation. In C1 were observed 6 animals (C1 n=6); in C2 were observed 7 animals (C2 n= 7); in C3 the animals observed were 3 (C3 n=3).

The total focal sampling performed were 48 (24 pre-meal + 24 rest); the total time of observations was 124,3 hours. A certain variability in the length of the observations depends on the fact that pre-meal observation length did vary,

because the food was not always distributed exactly at the same time (for logistical reasons) and sometime a slight delay could happen. Anyway only those observation where the delay in the food administration did not exceed 10 minutes have been selected.

The choice of these two moments was motivated by the fact that pre-meal moments might highlight possible stereotypes/abnormal behaviors, being frustrating to the horses. (Kiley-Worthington, 1983; Hockenhull and Creighton 2009 a)b)). Therefore we decided to observe horses in proximity and at distance from the meal, to have an exhaustive and representative set of situations.

The collection of data was aimed to obtain an **ethogram** (Fraser, 1998) of the animals, through the evaluations of the behaviors belonging to the different main behavioral categories:

- feeding (minutes of feeding behaviors) and other maintenance/care;
- social behaviors (divided into *"sticky"* and *"split"*) (Kiley-Worthington 2009);
- reactivity (standing drowsy/standing not drowsy min.; alert)
- movement
- others (abnormal/stereotypic)

Apart feeding, standing drowsy and standing not drowsy (recorded as minutes spent performing the behaviors) the frequency of the behaviors performed was recorded.

The aim of this behavioral approach was the detection of possible variation in time budget (respect the feral or domestic in "natural management") or the detection of behavioral changes (abnormal and stereotypic behaviors), as index of welfare deficiency (Waran, 1997).

Large differences in the amount of time a confined animal engages in behavioural activities (time budget) compared to feral or wild conspecifics has been used as a measure of poor welfare (Kiley-Worthington, 1989; Marsden, 1993; Waran, 1997).

Abnormal behaviors are defined as "*behavior that differs in pattern, frequency, or context from that shown by most members of the species in conditions that*

allow a full range of behavior" (Fraser and Broom, 1990). They include **apathy, unresponsiveness, hyper-responsiveness,** stereotypic behaviors. **Stereotypes** are *behavioral patterns that are repetitive, invariant, and apparently functionless and purposeless* (Odberg, 1978); for a review see: Mason, 1991; Odberg, 1999. In horses they have been decrypted and they include crib biting, wind sucking, weaving, head tossing, head nodding (Kiley-Worthinghton, 1973, 1983, 1987; Mason, 1979; Nicol, 1999). Other behavioral changes could include **increased aggressions, radical change in the time budget**, developmental anomalies, significant increase in behaviors related to frustration and conflict, such as **increases in behaviours in origin related to locomotion** (pawing, leaping, rearing, pacing), **or skin irritation**: head tossing- shaking; rubbing, chewing, scratching or licking self (self directed behaviors) or object (Kiley-Worthington, 1997).

All these behaviors are a sign of failure to cope with a poor environment because of their deviation from normal, functionally adaptive responses (may have a function for captive animals as part of their adaptation to the captive environment; however although these responses may be an attempt to solve environmental deficiencies, their continued expression does not mean they are wholly successful compared with related activities that might be performed in the wild, and that the horse's welfare is ensured (Cooper and Albentosa 2005). All these "problematic behaviors" being the symptom of the lack of appropriate environmental conditions (human-horse relationship included), should therefore considered as welfare concerning questions.

The behaviors' recorded were:

BEHAVIOR	DEFINITION
1) Feeding minutes	*Minutes spent performing food ingestion*
2) Others maintenance behaviors frequency	*Drinking; Defecating; Urinating; Lying; Rolling*
3) Self directed Behaviors frequency	Self-grooming: *licking its own body surface, nibbling or scraping of skin; scratching one part of body against some concrete surface and rubbing skin against some object in the environment*
4) Movement frequency	*More than three consecutive steps walking/trotting/galloping; except for those performed while grazing*

5) Sticky Behaviors frequency (behaviors aimed to cohesion) (Kiley-Wothinghton 2009)	<u>AFFILIATIVE</u>: Nicker: *a pulsed musical vocal call with the mouth closed;* Neigh: *a pulsed musical two syllable call, the second syllable with the mouth open;* Mutual grooming: *Two horses standing beside one another, usually head-to shoulder or head-to-tail, grooming each other's neck, mane, or tail by gentle nipping, nuzzling, or rubbing*; Standing beside: *Two horses standing beside one another, usually head-to shoulder or head-to-tail* Touch: the performer touch another with the nose or any part of the body; Smell: repeated slight extension and retraction of the external nares in the direction of another horse; Lick: extension of the tongue to touch any part of another's body Nose-to nose smelling: mutual smelling and touching of each others' noses Touch and lick/smell any part of another's body. <u>APPROACH AND INTEREST</u>: Approach: moving towards another directly, at least 3 m. within 5 sec Watch: head directed towards another usually with ears pricked and continuing for at least 5 sec Single or bilateral ears withdrawal in the direction of another horse with no rotation of the orifices inwards Snort: a large expiration of through the extended external nares, often repeated several times and often loud Leg strike: a lift of one front leg forward and above the recipients knee Squeal: a one syllable loud non musical call with the mouth open Head shake: a lateral movement of the head at least 3 times during another approach/interest display Head extend: an extension of the nose forward and toward another Head nod: at least 3 times movement of the head up and down, during another approach/interest
6) Split behaviors frequency (dispersive behaviors) (Kiley-Worthington 2009)	<u>AGGRESSIVE</u> BEHAVIORS: Bite: *mouth open, corners back, sometimes teeth exposed; opening and rapid closing of the jaws with the teeth grasping the flesh of another; the ears are pinned and lips retracted.* Bite threat: *similar to a bite except that no contact is made; the neck is stretched and ears pinned back as the head swings* toward the target horse Ears flatten: *ears flattened and rotated onto the head; often head extended on the neck*. Ears withdrawal: *both eras are withdrawn but not flattened, the orifices are slightly rotated inwards* Kick: *One or both hind legs lift off the ground and rapidly extend backwards toward another stallion, with apparent intent to make contact (in contrast to the kick threat described below). The forelegs support the weight of the body and the neck is often lowered.* Threat/display Kick: *quarters turned towards another, might be lifting of one hind leg, but without sufficient extension or force to make contact with the target horse. The hind leg(s) lifts slightly off the ground and under the body in tense "readiness", usually with no subsequent backward extension of the hind leg(s)* Tail swish*: the tail is moved laterally at least 5 times, when another is interacting* <u>AVOID/WITHDRAWAL</u>: (*Movement that maintains or increases an individual's distance from an approaching horse. The head is usually held low and ears turned hack)* Avoid: *one animal moves at least two m. away from another although no behaviors has been directed towards him* Withdrawal: *one animal moves at least two m. away from another when a*

	behavior has been directed towards him
7) Standing minutes	*Minutes spent:* *A)* Drowsy: *Head held with top of head lower than withers; ears relaxed or pointing in different directions; eyes semi-closed; one hind limb flexed so weight carried by the other 3; lower lip may hang loosely* *B)* Not drowsy: *Standing with head raised or moving, eyes opened and ears moving or oriented in the same direction*
8) Alert frequency	*Head raised, eyes widened, ears pricked, snorting, 4 limb carrying weight*
9) Stereotypic/ Abnormal-beh. frequency These beh were classified as abnormal. If differing in pattern, frequency, or context from that which is shown by most members of the species, stereotyp. If purposless, constant, repetitive (performed >10 continuous times) (Houpt and McDonnell; 1993)	Cribbing: *the horse grasps a fixed object with its incisors and sucks air; obvious on the video image by flexion of the neck muscles* *Head nodding: continuous, repetitive nodding of the head* Weaving: *side-to-side swaying motion involving the head, forequarters and occasionally may include the hindquarters* Wood/bar chewing: *the horse attempts to actively chew sites in its enclosure* Striking: *continuous, repetitive kicking of the front of the stall* Other Oral: *other oral stereotypes or abnormal not included above such as wind-sucking, self mutilation, lip snapping/licking, or bar licking* Other Movement: *other movement stereotypes or abnormal not included above; such significant increased behaviors related to frustration and conflict, to locomotion (pawing, leaping, rearing, pacing), or skin irritation (head tossing, shaking, rubbing, chewing, scratching or licking self or object)(Kiley-Worthington, 1997)*

Statistical analysis:

Data collected were analyzed by variance analysis (ANOVA one way) and Duncan *post hoc* test (significance threshold 0,05) to compare the three centers and find out possible statistical differences within each behavioral category. Pearson rank correlations were calculated to study the relationship between behavioral classes (significance threshold 0,01).

4) <u>ETHOLOGICAL EVALUATIONS DURING THERAPEUTIC ACTIVITIES</u>

Human-horse relationship might enhance or reduce the welfare of domestic horses: the daily relation with human (differences in handling/training-education/riding) has been noticed clearly to influence the general attitude of horses, and to be an important and often underestimated factor of welfare (Hausberger and Muller 2001). Negative experiences, linked to training, riding/handling methodic may lead to chronic states where horses ''switch off'', becoming unresponsive and apathetic (Hall *et al.,* 2008), states described in humans in cases of work related burn out (Iverson *et al.,* 1998).

Differences in the emotional reactions of horses (outside the working situation) in behavioral tests were observed according to the type of work (Hausberger *et al.,* 2004), even if others Authors didn't find any difference in the reactivity of TR and Jumping horses (Minero *et al.,* 2006).

Indicators are pointing to an association between stereotypic behavior and chronic stress; (McGreevy *et al* 1995). Noteworthy, although time spent performing stereotypes increases with time spent in stall (McGreevy *et al.,* 1995), it may also increase with time spent working (Christie *et al.,* 2006).

A differences in prevalence of stereotypes has been related to the type of work: different riding styles might impose different ranges of physical and psychological stressors to the horse, that could explain these findings (Mills 2005). Experimental observations revealed that the prevalence and types of stereotypes (mostly mouth movements and head tossing/nodding) strongly depend upon the type of work (Hausberger *et al.,* 2009).

One aspect of job that might lead to negative consequences was highlighted to be related to its constrictiveness: a recent study showed that some dressage practices was associated with more tail swishing, mouth opening and fear reactions than was observed in other horses (Von Borstel *et al.,* 2009) and constraint was related with the main variation of physiological index of stress respect their basal values (Minero *et al.,* 2006).

Even if there is no univocal interpretation of the outcomes of horse assisted therapies and activities for their animal protagonist, however much of the

previous studies agree on the potential negative effects (to the horse) of the relationship with some kind of patient or within some setting's characteristics (Anderson *et al.,* 1999; Suthers-McCabe 2002; Minero *et al.,* 2003; Minero *et al.,* 2004; Minero *et al.,* 2006; Kaiser *et al.,* 2006).

Of the horses observed during pre-meal/rest 10 individuals (n=10) were further observed during the TR activities: animals focal samples were continuously recorded during all the job-session.
In C1 we couldn't observe all the 6 ponies that have previously been object of the first ethological approach (pre-meal/rest), having been the amount of job strongly reduced for the absence of the children during the experimental periods (due to health problems and to the closeness of the holidays). Hence in C1 were specifically selected for the behavioral observation during job two ponies, in agreement with the statement of the TR instructor that defined them to be the "best" and the "worst", among the ponies of the Center (C1 n=2).
In C2 among the 7 horses kept for TR we could observe during job only 5 of them (C2 n=5), cause the others 2 were not used during the time period of our experimental observations. In C3 all the three horses kept were observed during job (C3 n=3).
The time of observations was included between 9 am and 18 pm.
The total focal sampling performed were 52; the total time of observations was 1.237 min. The mean length of each job session recording was 24,2 ± 6,7 minutes (for practical reasons we did record only the part of the sessions that took place inside the riding arena).

The behaviors that we addressed belong to the following classes:

- *social behaviors* (etero and omo specifics);
- *reactive behaviors*;
- *frustration and conflict*;
- *self directed*;
- *non compliant behaviors*.

The **qualitative-quantitative assessment of these behavioral categories** was aimed to detect possible:

- increase in frustration/conflict or self directed behaviors;
- reactive anomalies;
- problems in the relationship with humans (aggressive behaviors, non compliant behaviors) or its strengthens (friendliness towards humans).

These findings as seen might affect both the animal welfare and the efficacy of the therapeutic interventions (being a possible symptom/consequence of a lack of quality in the human-horse relationship).

The frequency of the following behaviors was recorded though direct observations:

BEHAVIOR	DEFINITION
1) Frustration Conflict	Defecating: *expulsion of feces* Sneeze: *expulsion of air from the nares, at least 5 times* Pawing: *movement of one forelimb scratching the soil with the hoof (less vertical than stomping)* Tail Swish: *the tail is rapidly moved laterally at least 5 times* Head shaking *the head is moved laterally at least 5 times* Head Tossing *the head is moved up and down at least 5 times* Chewing bite/Teeth grinding/Lip nipping: *lateral movement of jaws at least 30 sec, movement of lips up and down at least 30 sec*
2) Self Directed	*Licking its own body surface, nibbling or scraping of skin; scratching one part of body against some concrete surface and rubbing skin against some object in the environment*
3) Non Compliant	Refusing standing: *the horse moves at least 3 steps when demanded to stand;* Stop: *the horse stop while walking and refuses to walk on for at least 30 sec when demanded to walk;* Refusing moving: *the horse refuses to start walking for at least 30 sec;* Push: *the horse push the handler/child with the head/shoulder while walking or standing;* Others *behaviors deliberately non in compliance with the handler/child requests, in contrast with the training/education received and interfering with the job session and not related to fear*
4) Alert	*Head raised, eyes widened, ears pricked, snorting, 4 limb carrying weight*
5) Drowsy attitude	*Head held with top of head lower than withers; ears relaxed or pointing in different directions; eyes semi-closed; one hind limb flexed so weight carried by the other 3; lower lip may hang loosely*
6) Seeking human's contact	Nicker: *a pulsed musical vocal call with the mouth closed directed tow child/handler* Watching/turning the head toward*: head directed towards handl/child, usually with ears pricked and continuing for at least 5 sec* Touch/rubbing: *the performer touch the child/handler with the nose or*

	any part of the body Smell: *repeated slight extension and retraction of the external nares in the direction of child/handler;* Lick: *extension of the tongue to touch any part of child/handler body*
7) Aggressive towards Humans	As consequence of child/handler's action, the horse performs toward them: Bite: *mouth open, corners back, sometimes teeth exposed; opening and rapid closing of the jaws with the teeth grasping a part of human body/colthes; the ears are pinned and lips retracted.* Bite threat: *similar to a bite except that no contact is made; the neck is stretched and ears pinned back as the head swings* toward the target Ears flatten: *ears flattened and rotated onto the head; often head extended on the neck*. Ears withdrawal: *both eras are withdrawn but not flattened, the orifices are slightly rotated inwards, often the chin and nostrils are tensed and head risen* Kick: *One or both hind legs lift off the ground and rapidly extend backwards, with apparent intent to make contact (in contrast to the kick threat described below). The forelegs support the weight of the body and the neck is often lowered.* Threat/display Kick: *quarters turned towards, might be lifting of one hind leg, but without sufficient extension or force to make contact with the target horse. The hind leg(s) lifts slightly off the ground and under the body in tense "readiness", usually with no subsequent backward extension of the hind leg(s)*
8) Aggressive towards Equine	Bite; Bite threat; Ears flatten; ears withdrawal; Kick; Kick display; toward another horse

Statistical analysis:

Data collected were analyzed by variance analysis (ANOVA one way) and Duncan *post hoc* test (significance threshold 0,05) to compare the three centers and find out possible statistical differences within each behavioral category .

5) <u>PHYSIOLOGICAL PARAMETERS</u> (HRV; HR;)

Individuals' response to the stimuli connected with job might be related to their differences in temperamental traits and in the copying strategies adopted. Many behavioral tests has been adopted, aimed to evaluate individual differences (Manteca 1993).

Recently it was shown that heart rate (HR) and heart rate variability (HRV) in rats also are useful to differentiate between individuals (Sgoifo *et al.,* 1997).

HRV represents the net effect of the parasympathetic nerves that slow it down and the sympathetic nerves that accelerate it. In resting conditions both parts of the autonomic nervous system are thought to be tonically active.

Different stressors can induce a shift of the autonomic balance towards either a sympathetic or a parasympathetic dominance. A decreased HRV reflects a shift of the autonomic balance towards a more sympathetic dominance (Task Force of the ESC and the NASPE, 1996; Sgoifo *et al.,* 1997).

In a human study by Friedman and Thayer (1998), it was shown that patients with chronic anxiety (panic disorder) exhibit lower levels of HRV and higher levels of mean HR compared to their controls.

The parasympathetic branch of the autonomic nervous system seems to be associated with adaptive responsivity to the environment (Visser *et al.,* 2002).

Individuals with a higher parasympathetic activity would be more exploratory and adaptive to environmental demands.

Heart rate (HR) and heart rate variability (HRV) were used to study the physiological responses to the job and the adaptation of horses to their job. The analysis of heart rate variability has been used to study the balance between the sympathetic and the parasympathetic branches of the autonomic nervous system in several species (Stein *et al.,* 1994; Sgoifo *et al.,* 1997; Korte *et al.,* 1999).

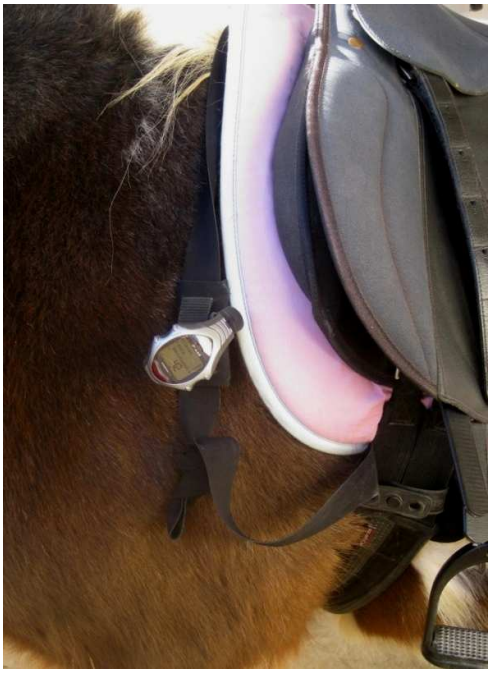

Fig. 6.1: ***The watch-transmitter and the receiver (under the girth) onto one experimental subject***

Heart rate, expressed as beat-to beat (R-R) interval duration (m/sec) was telemetrically recorded (5 sec-intervals) with Polar Vantage NV^2 during each job session. A special elastic girth belt with a built-in-transmitter was fixed under the saddle (one electrode was placed under the girth and the other under the saddle's tree, on the wither). A wristwatch receiver was tied onto the saddle as well (fig.6.1). The receiver had a memory function and stored data from the transmitter. Afterwards, data were downloaded, via a Polar Interface2, onto a PC. To have a basal value heart variables were recorded with horses resting in their box, with neutral environmental stimuli (3 measures, lasting each 5 minutes, taken in different days, and waiting for 5 minutes after the heart monitor positioning before starting the records). The heart variables measured were the mean heart frequency (HR, bpm) and the root mean square of successive R-R interval differences (rMSSD, msec) as a measure for heart rate variability. HRV describes variations of both instantaneous heart rate and inter-beat intervals (IBI) (Task Force of the ESC and the NASPE, 1996) and gives information about the sympathetic–parasympathetic autonomic balance. The rMSSD estimates the influence of the parasympathetic nervous system on heart rate variability (Stein *et al.,* 1994; Sgoifo *et al*., 1997; Visser *et al.,* 2003).

After their download a preliminary visual analysis of data was carried out in order to identify artifacts caused by movements of electrodes on the skin or muscle contraction. Recordings without artifacts were selected and the artifacts were manually removed for each horse.

Statistical analysis:

First of all the horses were evaluated as a unique group (as TR-horses) and t-Test was used to compare the broad group's basal values to the broad group's job values (both for mean HR and mean HRV) (significance threshold P<0,05).

To evaluate the response of each individual during TR job, t-Test was used to compare each individual's mean basal value to its correspondent mean job value (t-Test was repeated for each individual, comparing both the HR basal-value to the HR job-value, and the HRV basal-value to the HRV job-value). (significance threshold P<0,05).

Moreover ANOVA and Duncan *post hoc* test were applied to compare the individuals, as concern their HR (HR-basal values and HR-job values were compared among individuals) and as concern their HRV (HRV-basal values and HRV-job values were compared among individuals, significance threshold P<0,05).

6) HANDLING TASK:

a test settled to analytically assess some aspects of human-horse relationship

The relationship with humans might be one of the factors affecting equine welfare (Hausberger and Muller 2001; Hausberger *et al.,* 2008); moreover relational inputs were commonly identified as potentially stressing for the TR horses (Anderson *et al.,* 1999; Suthers-McCabe 2002; Minero *et al.,* 2003; Minero *et al.,* 2004; Minero *et al.,* 2006; Kaiser *et al.,* 2006), although TR (aims, methodologies, contents) should be linked to the beneficial effects of the relationship, to both its terms (human and equine).

Different kind of handling (such as of training and riding) might affect equine welfare.

Common display of poor welfare, consequence of negative humane-relational inputs might be stereotypes (McGreevy *et a.,* 1995; Mills, 2005; Hausberger *et*

al., 2009; Von Borstel *et al.,* 2009) or abnormal behaviors (Warren Smith and McGreevy 2008), such as:

- increased aggressions;
- significant increase in behaviors related to frustration and conflict (increase in behaviors in origin related *a)* to locomotion, like pawing, leaping, rearing, pacing; *b)* to skin irritation, like head tossing, shaking, rubbing, chewing, scratching or licking self or object) (Kiley-Worthington, 1997);
- differences in emotional reactions, towards a negative (McLean and McGreevy, 2006; Hall *et al.,* 2008) or a positive (Hausberger *et al.,* 2004; Von Borstel *et al.,* 2009) deviation from the normal reactivity (horses "switch-off" or hyper-reactive).

Moreover an increase in aggressions and incidents is an important safety issue, that might be connected to a poor quality of the human-horse relationship (Hausberger 2008).

The relationships are created on the basis of repeated interactions. Their 'valence' influences the quality of the relationship (Hinde, 1979). These principles apply to interspecific interactions too (Waiblinger *et al*. 2006; Hausberger *et al.*, 2008). Moreover, it appears that once established, the relationship is memorized and can be used to predict future interactions of horses with humans (Sankey *et al.,* 2010). Therefore if a series of positive interactions could create and influence the human–animal relationship in the long term, the daily human–horse contact (like that one of horses with the TR technicians) has a great influence on the way horses perceive humans, on the resulting relation with them and on the future equine attitude towards humans during therapeutic and extra-therapeutic contexts.

Several studies in the last years investigated the effectiveness of alternative methodic (so called *ethological* or *sympathetic*) in training and handling animals (Polito *et al.,* 2007; Innes and McBride 2007*;* Fureix *et al.,* 2009;

Hockenhull and Creighton 2009a; *Keeling et al., 2009;* Visser *et al.,* 2009; *Sankey et al., 2010*).

However there is still a lack of scientific knowledge on the effects of parameters such as ways of handling, attitude of the caretaker (posture, voice, etc.) on the horses reactions to humans, while these aspects are certainly crucial in the establishment of the relationship (Hausberger, 2008).

Empirical observations show a tendency for the trainers to use more negative reinforcements (learning to perform a behavior in order to avoid a disliked stimulus) (Nicol, 2005; Goodwin *et al*., 2009) and punishments (use of an aversive stimulus to inhibit a behavior) while paying little attention to potential positive reinforcement (Waran and Casey 2005).

Moreover a confusing use of reinforcement (ineffective rewards, lack of clarity of orders, poor timing) causes a state of learnt helplessness and lack of control in the horse and might induce confusions and lead to neurotic behaviors (Kiley-Worthington, 1997; Hausberger, 2008).

Correct handling procedures can lower reactivity levels in horses and may facilitate learning (Nicol, 2002); moreover interactive/cooperative teaching, similar to that used for preverbal infants, has been demonstrated could be successful in facilitating learning verbal cues in horses (Kiley-Worthington, 2009; Sankey *et al.,* 2010).

The implications of these findings might therefore be relevant for handling and teaching, enhancing the efficacy of training tasks and, therefore, empowering the benefits arising from the human-horse bond.

If, as above seen, others Authors did already identify the relationship with the patients as potential source of stress for the horses involved in TR, nevertheless none investigated yet the horses' relationship with their handlers.

As seen this topic might be crucial both to the equine welfare and to the empowerment of the beneficial effect of the relationship to the humans.

This might be possible, through the enhancement of horses' compliance, positive reactions, positive emotions and coping strategies towards aversive stimuli (intrinsic of TR context), that would be facilitated by an improvement of

human-horse relationship. If the safety should be the first presupposed need in therapeutic/educational activities, the full access to all their benefits is linked to the availability of relational benefits; possible only if the handler and the horse did first of all already built a positive relationship, through their previous day by day interactions.

Despite the handling might be a good indicator of the relationship existing between horse and humans, however scientific research in the past was focused on horse's reactions (behavioral or physiological), without assessing how humans *exactly* did act.
In order to improve humans' relationship with horses once should first be able to measure, or at least analytically assess it.
None analytical methodic has been validated yet to access the quality of the handling. Therefore we tried to settle an experimental protocol, to evaluate qualitatively and quantitatively the handling of TR technicians.
All the technicians of the 3 Centers (n=2 in C1; n=5 in C2; n=7 in C3) were requested to perform an handling task, in a structured situation, divided into 3 different sub-tasks:

1) Grooming and lifting one foot (into the stable) (3 min)
2) Handling task (into the riding-school) (3-7 min)
3) Blind part (the performer were told that the test was finished, while the experimenter continued to record for other 3 min).

The detail of the different requests of the tasks is reported in *fig.* 6.2; the exercises were took place in the dressage arena (represented in fig. 6.3 *);* the letters reported in the description of the task are those used as point of reference when performing exercises in the dressage arena.

The tasks were video-recorded and analyzed to attribute to each technicians a score, on the basis of the items reported in the schedule reported in fig.6.4.

Fig 6.2 *Detail of the different tasks scored in the three situations*

TEST'S SITUATION:

1) Preparing the horse into the stable (3 min. recording, with 3 min delay respect the begun of the prove):

Brushing, lift one foot, tacking

2) Performing exercises: into the riding arena (length variable between 3-7 min.)

Start in X
Walk toward B
At B walk on the track at the right hand
B slalom between poles (10 m);
5 m before A walk on a carpet (blue cloth, 1mlargex2mlong):
A Cross a small obstacle (cross-tree, 15 cm high)
diagonal K-L
Between K and L stop for 3 sec and walk Back (at least 3 steps);
Walk toward X
In X Untying test (the horse is untied, the leading rein is untied or left on the neck; the man stands for 20 seconds, and then starts walking calling the horse and inviting him to follow WITHOUT using the leading rein, any other stimulus other than apply pressure through leading rein/head collar is accepted)

1) **Bringing back and getting off saddle (BLIND)** (3 min.)**:**

The tested technicians is told the prove is finished, while the scoring go on further

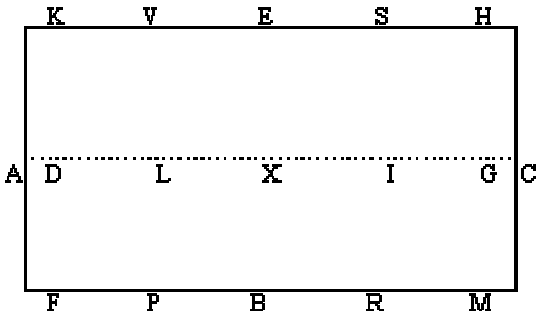

Fig 6.3 *Point of reference in the riding-arena*

0= NONE; +/- 1=SOME; +/- 2= MUCH+/- 3=COMPLETE	PREPAR (1)	EXCERC (2)	BLIND (3)
ABILITY OF OBTAINING HORSE'S ATTENTION and INTEREST:			
a) +EARS (at least one towards)			
b) +WATCH/ turn. head tow.			
c) +SMELLING			
d) +LICKING			
e) +UNTIEING TEST: horse walks away= 0 stands for 10 sec. =1 stands without following (after 20 sec) =2 stands and follows = 3			
CONSISTENCY CLARITY SIMPLICITY IN USE OF STIMULI: ***BODY LANGUAGE***			
f) +AWARE and CONSISTENT USE OF BODY POSITION			
g) - STIFFNESS			
h) +use of GAZE as stimulus			
i) + AVOIDING STARING			
GESTURES			
j) + EFFECTIVE USE OF HANDS (as stimulus/reinforcement)			
k) –UNEFFECTIVE/CONFUSING USE OF HANDS			
l) –PULLING LR			
m) -TIGHTENESS LR			
VOICE			
n) +EFFECTIVE USE			
o) –UNEFFECTIVE USE			
p) +CONSISTENT INTONATION+EXPRESSION			
q) – TALKING TO HUMANS			
EXTRA SCORES			
+ACHIEVEMENT OF TASKS 0-10			
+INNOVATION 0-5 Timing; Variation in quality/intensity of stimuli, Attention, Prediction and knowledge of horse			

Fig 6.4: ***Schedule used for technicians' scoring***

Each situation was separately scored. As reported in the schedule only in the central and longer part of the test (the part into the arena) every item was scored, while for the grooming and the blind part only some items were scored.

The scores went from -3 +3 (being 0=none; ±1=some; ±2much; ±3=complete).

The evaluated items in fact could refer either to positive aspects or to negative aspects of handling (having in the first case negative scores and in the second positives scores).

Moreover extra-scores were attributed to two further items, scored respectively from 0 to +10 and from 0 to +5.

Of the different items the minimum and maximum possible scores were:

- ✓ From 0 to 15 for the first item;

The middle was composed by three under-level:

- ✓ From -3 to 9;
- ✓ From -9 to 3;
- ✓ From -6 to 6.

The other items had possible scores varying

- ✓ From 0 to 10
- ✓ From 0 to 5.

Therefore the total possible scores, for the whole task, went from ***Min−18*** *to* ***Max +48***

The categories evaluated were:

1) **ABILITY in OBTAINING HORSE ATTENTION AND INTEREST**

   Ability of the handler to have the horse focused on him

   This items included all positives scores.

   Although the item aims to evaluate the handler, this is the only item that focuses on the horse, through detection of some horse's attitudes:

   - ✓ *direction of at least one ear toward the handler*
   - ✓ *direction of the horse' gaze/turning his head towards handler*

- ✓ *smelling the handler*
- ✓ *licking the handler*

2) **CONSISTENCY, CLARITY, SIMPLICITY IN THE USE IF STIMULI**

Learning and communication theories application and skills

This item includes 3 different areas evaluated by 6 negative scores and 6 positive scores

<u>*BODY LANGUAGE*</u>

- ✓ *Aware and consistent use of body position*:
  consistency with postural/expressive communication in horses (Kiley-Worthington 1987; Kiley-Wothington 2009; Li Destri Nicosia 2004)
- ✓ *Stiffness*: ” “
- ✓ *Use of gaze as a stimulus*: “ “
- ✓ *Avoiding staring*: ” “

<u>*GESTURES*</u>

- ✓ *Effective use of hands (as stimulus/reinforcement)*:
  To apply the use of caress or other hands’ movement intentionally, consistently with the intentional message, so that horse do perform the requests.
  This is evaluated through the correspondence of horse’s response with the human intention (correspondence among: intention of the sender/ real content of the message transferred/ behavior performed by receiver). This is fundamental to prevent lost of efficacy of primary or secondary reinforcement (Kiley-Worthington, 2004; Hausberger *et al.,* 2008; Kiley-Worthington, 2010); e.g. when the message is to communicate calmness the horse appears more relaxed, if it is to threat the horse appears concerned about it, *etc.*
- ✓ *Uneffective/confusing use of hands*:

To apply use of caress or other hands' movement un-intentionally or un-consistently with the intention of the messages; e.g. continuous caressing or patching horse body even if he is performing the unrequested behavior, *etc.*

- ✓ *Pulling leading reins*:
  Hanging on leading rein, to transfer messages or un-intentionally
- ✓ *Tightness of leading rein*:
  Leading rein hold so short to prevent natural movement of horse's head while walking (approximately between 10-20 cm length)

VOICE

This item refer to modern studies on the horse' ability to understand human language and on its following possible positive consequences to improve the relationship and to increase training efficacy (Kiley-Worthington, 2009). The evaluated items were:

- ✓ *Effective use*: To apply the use of vocal messages intentionally and consistently with the intentional message; the horse does perform the requests. This is evaluated through the correspondence of horse's response with the human intention (correspondence among: intention of the sender/ real content of the message transferred/ behavior performed by receiver) e.g. when the aim is to solicit the horse start walking/walk faster, if it is to slow it down or to calm it will slow the walk or will appear more relaxed *etc*
- ✓ *Ineffective use*:
  To apply use of vocal messages un-intentionally or un-consistently with the intention of the messages; e.g. continuous talking without any real communication or talking gently, even if the horse is performing unrequested behaviors *etc.*
- ✓ *Consistency of intonation/expression*:
  The message transmitted is not the message desired
- ✓ *Talking to others humans*:

To talk continuously with other humans without paying attention to the horse (to talk to humans longer than 3 min., continuatively and without watching the horse)

3) EXTRA SCORES

All positive (maximum 10 min 0)

- ✓ *ACHIEVEMENT OF TASKS* (0-10):
  eventually the requests are satisfied by the horse, or the wanted effect is obtained (e.g. to relax or to negatively reinforce some behavior *etc.*) even if this did request several attempts or long time.
- ✓ *INNOVATION: timing, variation in quality/intensity of stimuli, attention, prediction and knowledge of horse (0-5)*
  Capacity to observe horse behaviors, to interpret their meaning and to react on the basis of the prediction (related to individual temperament differences/ past experiences of each horse) of the effective reinforcing consequence of our behaviors. This item, in contrast with the previous, do not score the achievement of the tasks, while the capacity to varying and modulating strategies (as concern quality, variety, intensity of reinforcement) and applying/interrupting in the correct time.

6.2. FURTHER EXPLORATION OF THE HUMAN-HORSE RELATIONSHIP TRHOUGH AN EDUCATIONAL AND THERAPEUTIC INTERVENTION

6.2.1. SCHOOLS-PROJECT and empowerment of Beneficial effects of H-H Relationship: Emotional, Sociological, Educational possibilities arisen by the "holistic" approach to TR activities

This approach attain to the third and last order of aims of our research: evaluation of the possible improvement in AAA/TAA' effectiveness, through a full access to the relationship with horses.
Some ethological concepts inspired both methodologies/contents of the educative-rehabilitative intervention, and the husbandry criteria of the equines kept in the Centre.
Human-horse relationship produces beneficial effects for man that are directly or indirectly related also to some ethological characteristics of equine. Equine reactivity and intra or inter-specific social behaviors should be considered essential in each educational or rehabilitative intervention.

The intervention was aimed to facilitate the social inclusion of a group of children that already attended the Centre for therapeutic riding activities and to reach social-affective-behavioral educational goals for their whole school classes.
Therapeutic Riding is considered to be a global rehabilitative intervention, approaching all the needs of the person. Nevertheless the most ambitious objective is to set joint and coordinated interventions, aimed to reduce the social outcast of disabled people beginning from the juvenile phases of life (particularly in the first extra-familiar social contact that is the scholastic context).
The aims of the evaluated intervention were to exploit the potential benefits of TR, widening its effects in order to:
facilitate the social inclusion of disabled children attending a TR project; educate the whole classes (teachers included) *to* the relationship with animals and *through* the relationship with animals.
In particular these aims were pursued having a direct experiences of equine specific social behaviors.
The contents and methodologies of the intervention evaluated are the result of the Veterinarian's involvement in the TR staff; the role of the Veterinarian (specialized in applied ethology) has been central both in the training of the TR

technicians and in the disposal of a proper management and husbandry of the animals.

The project has been conducted in one of the Centers included in the previous enquiry (survey by questionnaires), from 2007 until 2009.

In the project were involved 8 horses (7 females 1 gender), aged between 12-28, normally utilized in TR activities.

In order to promote the successful coping of TR horses and to enhance positive relation with human beings animals were subjected to specific management criteria, specifically settled by the Veterinary responsible of equine welfare subsequently to previous evaluations of abnormal behaviors and their possible prevention in TR horses (Li Destri Nicosia *et al.,* 2009 $_{b)c)}$). The management and husbandry criteria has been inspired by a revision of the latest scientific researches; they included: equestrian techniques/training aimed to psychological-physical relax, in agreement with biomechanical and ethological equine characteristics (Denoix and Pailloux, 1999; Heushman, 2007; McGrevy, 2007); functional trimming of un-shoed feet aimed to restore anatomical components (vascular, nervous, corneas and connectivals) and mechanical and biomechanical functionality (Pollitt, 1992; Bowker *et al*., 1998; Bowker, 2003; Teskey, 2005); respect of social needs through proper evaluation of housing criteria (Kiley-Worthington, 1987; Kiley–Worthington, 2005); physiological timing of nourishment and composition of the diet (Harris, 2007).

Since 2007 the project has involved 19 classes of primary and secondary school through two appointments each: one at school and one at the TR centre (the school classes that were attended by 19 disabled children that already were involved in a TR individual project at the Centre).

The project has been supported by Bologna Municipality and ASL Bologna. It has been conducted in agreement with the families and the school-teachers; all the activities were conducted in compliance with the current dispositions about privacy (Dlgs. n. 196/2003).

During the appointments children has been offered the possibility to experience, through different "ethological games" and activities equine language, social composition structure and dynamics of equine herd; the

different roles within individuals and the importance of cooperation and co-ordination (Kiley-Worthington, 1998) has been particularly emphasized through the different experiences put in practice.

At school first some cartoon scenes (pertaining to the social life of the equine and to their natural way of life) has been shown to the children. By the vision of the movie and through different following typologies of activity (conversation arisen about equine communication and social life, role playing games, multisensory experiences) the children could acquire more knowledge and awareness about the difference between fantastic and realistic aspects of the human-horse interaction. During all the activities the role of the disable child has been emphasized, as main expert of the "real equine world". Finally during the vision of some pictures (about the TR horses and their different interactions with the disabled child) was highlighted the diversity among each horse of the Centre and the relevance of these diversity for the functioning of the equine society.

At the TR Centre the children has been first involved in a role playing game; they had to reproduce a typical situation of the equine herd life, having assigned to themselves the different roles by communicating through the use of non verbal language. Then the children could put in practice their knowledge directly with the horses (they first met the herd, free in the riding school, and then the single horses) and tried to interpret their language and to react properly to their messages.

In order to evaluate the effects on the children questionnaires were administered before (Pre-Activities Questionnaires, PreAQ) and after (Post-Activities Questionnaires, PostAQ) activities to the teachers.

Questions of PreAQ aimed to evaluate the teacher's personal disposition through the project, because of her/his personal or professional past experiences (animal ownership, type of past relationships with animals, past experiences with activities and therapies animal assisted).

Moreover they aimed to evaluate level and degree of disabled child involvement during school activities; to estimate how different activities and

rehabilitative interventions were inter-related among each other and to detect others socially critical situations in the class.

PostAQ aimed to collect teacher's final evaluation about social dynamics among children (either during or after activities) and to get any teacher's suggestions.

A socio-metric test (Moreno's Sociogram) (Moreno, 1980) has been administered to one class, in order to detect possible modifications of social dynamics among children. Children have been tested twice, before and after activities. More in detail children have been asked to express their preference and refusals (by drawing two different teams: one was their own team and the other one the team they would not like to be part of during the activities with horses). A socio-metric evaluation of the class has been carried out by the comparison of reciprocal preferences and refusals.

During the scholastic year the disabled child (included in the above mentioned tested class) was involved once a week in TR activities (particularly aimed to social-affective-behavioral goals and based on the same ethological concepts and activities above decrypted). The child has been monitored by the staff, that drawn up a final report of the yearly intervention

Fig. 6.5: *Questionnaires for the evaluation of the results of the horses assisted project on children and teachers (Pre-Activities and Post-Activities)*

TEACHERS-QUESTIONNAIRE PRE-ACTVITIES (pre-A.Q:)

1. Do you have any animal?
2. What animal?
3. Where does he live (at home, in your garden…)?
4. Did you ever participate to any other animal-assisted project ?
5. When and where?
6. Which type of animals were involved?
7. Did it have any impact on relational dynamics among the children? Did it give you any cue concerning relational dynamics among the children ?
8. Did this class ever been involved in others animal-assisted-project?
9. Which are your expectations related to this project (both for the disabled child and for the whole class)?
10. How would you describe the relationship between the disabled child and his school mates?
11. Which is the level and type of involvement to the scholastic life for the disabled child?
12. Did ever the disabled child refer to his past experiences with horses during scholastic activities? If yes how did he refer to them?
13. Did you ever notice in the disabled child any symptoms of emotive involvement related to the future participation of his class to his own experience
14. Are there any other problematic children in the class? (even if not certified)

TEACHERS-QUESTIONNAIRE POST-ACTVITIES (post-A.Q:)

1. Did you notice through the course of activities (at school or at the riding center) any particular display (performed by the disabled child or by the whole class) differing respect those performed during the normal scholastic life (concerning their kind/intensity)
2. If yes which areas did they concern?

e.g.

- Attentiveness to the topics treated
- Level and degree of involvement/participation
- Attitudes toward the child and/or others school mates
- Performance of new abilities and specific skills
- Behavioral aspects not fully previously expressed
- Dynamics within the group (preferences, alliances, roles)
- Other (please detail):

3. Did you notice after the course of the project any change (concerning the aforesaid areas) displayed by the child or his school mates? If yes which areas did they concern?
4. Do you believe that a greater utterance of the project (more appointments at school or at the riding school) would be useful to its goals achievement (related to the child or to the whole class)?
5. Did you approve the purposed activities ? (if not please explain why)
6. Did the activities meet your expectations? If they did differ respect your expectations may you define concerning what?
7. Do you believe that the children would like a possible continuation of the project (through some more appointments at school or at the riding school)?
8. And you?
9. Do you believe that do not having let all the children to ride was a consistent (with the aims of the project) choice?
10. Have you got any suggestions concerning possible further project s (with this or with different classes)?

Fig 6.6: *Table for the Moreno's Sociogram*

Child → Name ↓	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**				
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Fig. 6.7: *Informative material for the teachers*

<u>INSTRUCTIONS FOR THE TEACHERS CONCERNING THE TASKS TO BE PURPOSED TO THE CHILDREN (aimed to the evaluation of social dynamics among the children) AND THE THE FILL OF Moreno's Sociogram</u>

The tasks are aimed to evaluate the social dynamics among the children and the possible modification related to the activities that we are going to purpose (particularly concerning the finding of new skills expressed by the disabled child).

<u>BEFORE THE SCHOOL APPOINTMENT WITH CHILDREN</u>:

1. Think about three children of your class that you would like to be in your own team, for the games we are going to play with the horses. Therefore draw the whole team (included you). Write the name of each child in the paper.
2. Thinks about those children you would like not to be part of your team for the games we are going to play with the horses (draw them and write their name on the paper)

<u>AFTER THE RIDING-SCHOOL APPOINMENT</u> :

1. Draw your ideal "children-herd" (representing you and the others children you would like to be members of it). Write also the roles and the name of each "child-horse" on the paper.
2. Draw the herd you would like not to be part of (three children of your class) and write their name on the paper.

<u>For us would be important if the children were completely free to express their real preferences and their real comprehension of the tasks. It should be clear to them that the tasks would not be object of didactic evaluation. It is important that the children do not talk each other during the test (to prevent possible reciprocal conditioning)</u>.

To fill the table you should write both on the first column and on the first line (those numbered in the paper) the complete list of the children's names. Once you have collected the drawings the names of the favorite/refused children should be reported in the table. The choice of each child should be reported on the horizontal lines (marking with + the preference and with – the refusal) . So i twill be possible to read on the vertical columns the total preference and refusal received by each child. The total number of preferences and refusals received should be reported in the bottom line (respectively where is written tot + and tot -) .

7. RESULTS:

7.1. PRESIDENTS' QUESTIONNAIRES:

One questionnaire for each of the 8 center was filled by its president. To have a comparative vision of the whole items see tables at the end of the paragraph 7.2.

- ***INFORMATIONS ABOUT THE CENTER AND ITS JOB*** (7 items):

The average **number of patients** attending the Center was 68 ± 52,7; the Centers were classified as: 3 centers as *big* (150-100 users); 3 as *medium* (60-30 users), 2 as *small* (≤20 users).

2 centers had a long **therapeutic experience**, having been working since more than 15 years; 1 since more than 10; 4 since more than 5; 1 was a really young association that have been created since one year.

However its president had a long TR job experience and the horses kept in the center did already work within TR activities since 5 years, for another association (therefore we decided to use also the data concerning those horses, in relation to their past TR job).

The average **number of technicians** working in the center was 6,2 ± 4,2; moreover a great number of others people have been working with the horses (as stager, voluntaries etc.) average 9,1 ± 11.

There was a certain variability in the average **ratio users/technicians** (11,6 ± 9,5), even among those centers that were opened the same amount of days per week; the highest ratio users/technicians is attributed to the French and the Swiss center: respectively 33,3 and 15.

As concern the temporal **distribution of job** in 5 centers it was quite homogenous during the week, while in 3 centers the job was mainly concentrated in one part of the week (for logistical reasons due to the structures' sharing with others clients).

Only in 1 center job was more or less constantly distributed during the year, while in the others it was mainly concentrated during the scholastic period (even if 6 of them were opened for 11 months).

The **activities performed** by the centers, in addition to hippo-therapy and remedial and educational riding, were:
sport and competitions for disabled (4 centers); vaulting (3 centers); driving (3 centers); educational activities for normal children (sporadically) (6 centers); inclusion projects involving mixed groups of disabled and normal people (regularly performed by 2 centers and sporadically by 6); occupational therapy (4 centers).
The **qualification of the technicians** was quite variable, including a basic education (psychologists, human doctors, veterinary doctors, psycomotrists, professional educators, gym-instructors, riding instructors, physiotherapists, *etc*.) and a specific (TR related) education, including qualifications obtained by the two main TR associations existing in Italy (ANIRE LAPO) or by the equestrian national federations (FISE, ANTE, SEF ITALIA, French and Swiss equestrian federations, or other) or others associations acting within the area of Pet-therapy (SIUA, AIUCA, others).

- ***INFORMATIONS ABOUT THE HORSES*** (10 items)

The total number of horses kept in the centers was 44 (average 5,5±2,7); the average ratio users/horse was 11,2 ± 6,5.
The average age of the horses was 14,5 ±5,2; the average **individual job-longevity** (average numbers of years the horses have been working within TR) was 4 ± 2,8 (see tab. 7.1).
Moreover per each center an **index of longevity** was calculated (% of horses working within TR since different number of years) and the horses were assigned to three different classes (L0=working since 2 or less years; L1=working since 5 or more years; L2=working since 10 or more years).
The results must also be related to the number of years each center have been working, therefore the **highest** indexes were assigned, in order, to:
C1 (≥5 Y of job): L1=100%;
C5 (≥15 Y of job):L2=66,6%; L1=16,7%; L0=16,7%;
C8 (≥5 Y of job): L2=60%; L1= 40%;
The **lowest** was assigned to

C2 (≥15 Y of job): L2=14,3%; L1=28,6%; L0=57%;

The others Center had **intermediate** indexes:

C7 (≥10 Y of job): L2=27,27%; L1=45,45%; L0=27,27%

C6 and **C3(≥5 Y of job)**: L2=33,3%; L1=33,3%; L0=33,3%;

C4 (≥5 Y of job): L2=0; L1=66,1%; L0= 33,3%.

As concern the **time and reasons of the rejections** the presidents had to answer about the occurrence of the earliest and the latest one (maximum and minimum number of years of job before the rejection in their center): 2 of the centers declared having rejected only one horse each since the begin of the activities and 2 declared having rejected none yet. In the others 50% (4 centers) the earliest rejections were related to behavioral problems, while the latest rejections were related to physical problems or oldness. As concern the time of rejection the most premature occurred earlier than 6 months (of horse's activity), the most tardy occurred later than 10 years of horse's activity.

The choice of the horses to be involved in TR is made by the same person responsible of all the therapeutic activities, except than in two of the centers, where all the **decisions regarding the horses** are made by one of the technicians "expert" about horses (in one case a riding instructor, owner of the animals, and in the other case a TR technicians that is also the owner of a stable with several horses).

The others decisions regarding the horses are generally made by the same person above mentioned, in agreement with the vet (in 2 centers), with the groom and with owner of the school were the animals are kept (see tab 7.2).

In fact the property of the horses is not always of the TR centers: in 1 center all the horses belong to a riding school (3 horses at all);

3 centers own all their horses (20 animals at all);

4 centers own part of the horses (14), while they rent (or use for free) some others animals (7 horses at all: 4 of which belong to a riding school and 3 to privates owners).

CENTER	YEARS of activity of the Center	Number of HORSES	AVERAGE HORSES' AGE	RATIO USERS/HORSES	TOT AVERAGE LOGEVITY	LONGEVITY INDEXES= *% of horses belonging to each longevity class* (on the basis of the n. of years of job)		
						L0=≤2 years of job	L1=≥5 years of job	L2=≥10 years of job
C1	≥5	6	17±3,69	16,6	5		**100%**	
C2	≥15	7	14,6±4,4	7,1	2,6 ±3,3	**57,1%**	**28,6%**	**14,3%**
C3	≥5	3	114±,3	10	3,7 ±3,0	**33,3%**	**33,3%**	**33,3%**
C4	≥5	3	16,6±5	3	4 ±1,7	**33,3%**	**66,7%**	
C5	≥15	6	15±3,8	23,3	5,4 ±4	**16,7%**	**16,7%**	**66,6%**
C6	≥5	3	16,3±5,7	5	3,7 ±2,5	**33,3%**	**33,3%**	**33,3%**
C7	≥10	11	12,36±,6	12,7	3,8 ±3,4	**27,3%**	**45,4%**	**27,3%**
C8	≥5	5	15,4±6,6	12	4,6 ±1,7	**40%**	**60%**	
TOT CENTERS		44	14,4±5,3	11,2± 6,6	4 ±2,8			

Tab.7.1: *Indexes for the evaluations of the average amount of job per horse and of horses' average longevity, per each center*

Therefore within 3 centers the horses are used only for TR, while in the others 5 they do work also within riding school too.

In the 5 centers where the horses do work also with different activities (respect TR) none regular specific training was provided to the animals (except the initial period, before starting working in TR, in one of the centers).

The same lack of regularity and structured organization is referred as concern a possible screening of the horses about their responses to the TR activity.

In fact even if all the 8 centers answered that a sort of screening is provided, to ensure the aptitude and welfare of the horses, when answered about its timing and organization it was reported that in 5 centers there isn't any specific responsible for this screening (all the technicians are equally responsible as concern this role); in 3 centers there is one or more people responsible, but only in one of them there are specific and fixed moments exclusively aimed to horses' screening/training, while in the others 2 this specific time is not regularly planned or exclusively used for this aim.

In the others 2 centers the "alternative job" was less programmed or structured: in one center the horses were sporadically used by the technicians (the technicians sporadically have riding lessons by a professional riding

instructor); in the other center the horses were sporadically ridden by some of the technicians, on the basis of their spontaneous initiative.

Only in one of the 3 centers devoted exclusively to TR are provided specific training-sessions to the animals (as "alternative to the therapeutic job").

Tab. 7.2: *Decision-makers concerning horses*

***DECISIONS*:**	***Decision-maker***							
	C1	***C2***	***C3***	***C4***	***C5***	***C6***	***C7***	***C8***
Inclusion /Rejection	Riding Instructors.	TR - responsible	TR-responsible	TR-responsible + Riding instructors	Special technicians. "horses' - responsible"	Riding school's owner	TR – responsible.	TR-Responsible
Initial/periodic. training	"	Riding instr.	TR-resp	T- resp + Rid.instr	"	"	Professional trainer	TR-Resp
Type of stalling	"	TR-resp	TR-resp	Rid.instr	"	"	Groom	Federal Committe
Nutrition	"	TR-resp	Vet.	Rid.instr	"	"	Groom	Vet.

As concern the **husbandry of the horses** (see tab.7.3 and tab. 7.4.)

1 center keeps the horses in looses boxes, without any access to paddock/pasture;

2 centers keep the horses always in paddock/pasture (in 1 in group while in the other in individual paddock/yards);

in 5 of the centers the animals live in looses boxes and they are brought into paddock/yards (collectives in 3 centers and individuals in one center) for variable time periods: the shortest average time period being less than 10 hours per week (in two of the centers), while the two longest being respectively 72 and 40 hours per week (even if in one of them the horses are kept in quite small and individual paddock around 40 m^2 each, while in the other they are kept in a big yard, in group).

As concern the nutrition only in two of the centers the animals are fed twice, while in the others they are fed three time per day with hay, grains (and only

in one of them fruit and vegetables). In one center the horses have also access to pasture. As concern the length of the meals (and therefore the constant availability/restriction of fibers and forage) no data are available (having been the answers not completed as regard).

MANAGEMENT	***C1***	***C2***	***C3***	***C4***	***C5***	***C6***	***C7***	***C8***
Extra-TR Job	Pony Club	Riding School	None	Riding School (+1horse walks /driving)	None	Riding School	Riding School /Walks	Sporadic (Techn. take riding lessons on them)
Structured &Constant Training	NO (only-1st months before enro= lment)	NO (only sporadic; +free-school once /week)	NO (only sporadic ridden by some techn)	NO	YES Twice/ WeeK	NO	NO	NO
Structured &Constant Screening	NO (everyone is resp.)	NO	NO	NO	YES	NO	NO (only 1st 6 months)	NO (everyone is resp.)

Tab.7.3: *Management of horses concerning job (possible: job extra than TR; structured and constant training and screening of horses aimed to their welfare)*

AVERAGE hours/week SPENT OUT	***CENTER***	***SPRING***	***SUMMER***	***AUTUMN***	***WINTER***	*TOT* Weekly AVERAGE and type of grouping
	C1	ALWAYS (group yards/pasture)				ALWAYS (group)
	C2	30	40	30	20	30h (individ)
	C3	ALWAYS (individual paddocks)				ALWAYS (individ)
	C4	8	8	8	0	6h (indiv/group)
	C5	40	ALWAYS	40	40	72h (group)
	C6	NEVER				NEVER
	C7	10	16	10	0	9h
	C8	30	72	30	If poss	28h(group)

Tab .7.4: *Average number of hours/week spent out (paddock/bigger yard/pasture) during the different seasons of the year and relative type of grouping)*

- ***PRESIDENT'S SUBJECTIVE PERCEPTIONS*** (3 items):

Subjective **perception of** the president concerning **possible negative physical/psychological effects** of TR activities to the horses is (see fig 7.1 and fig .7.2.): 5 presidents (62%) declared that in their opinion this job do not physically affect horse welfare; 3 (38%) answered that it might cause back pain (for the heaviness/unbalance of disabled riders);

7 presidents (**87,7%**) answered that this activity might affect the psychological balance of the horses, referring this belief to: boredom, stress, stereotypic behaviors; diminishing of social attitude towards people; increase aggressive behaviors toward horses or people

1 president answered that, if properly managed, horses are not psychologically affected by TR job. In the presidents' beliefs and experience the most common reason of rejection of the horses are behavioral problems, mentioned by **62%** (stress; apathy; abnormal reactivity; fear; aggressions to people/horses), 48% of the total answers referred as reason of rejection physical problems (oldness; illness; lameness or others orthopedic problems) .

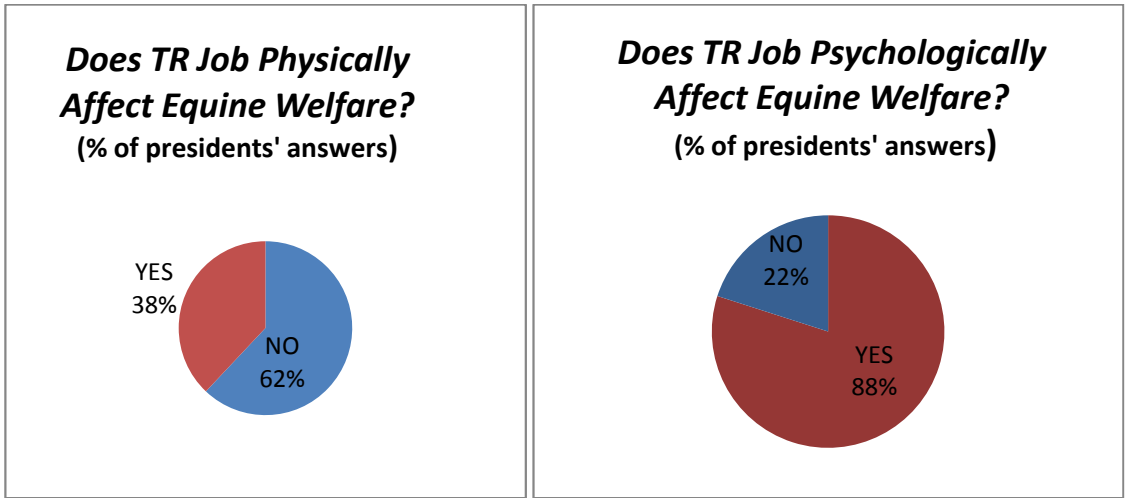


Fig.7.1: *Presidents' perception of TR psycho-physical impact on horses*

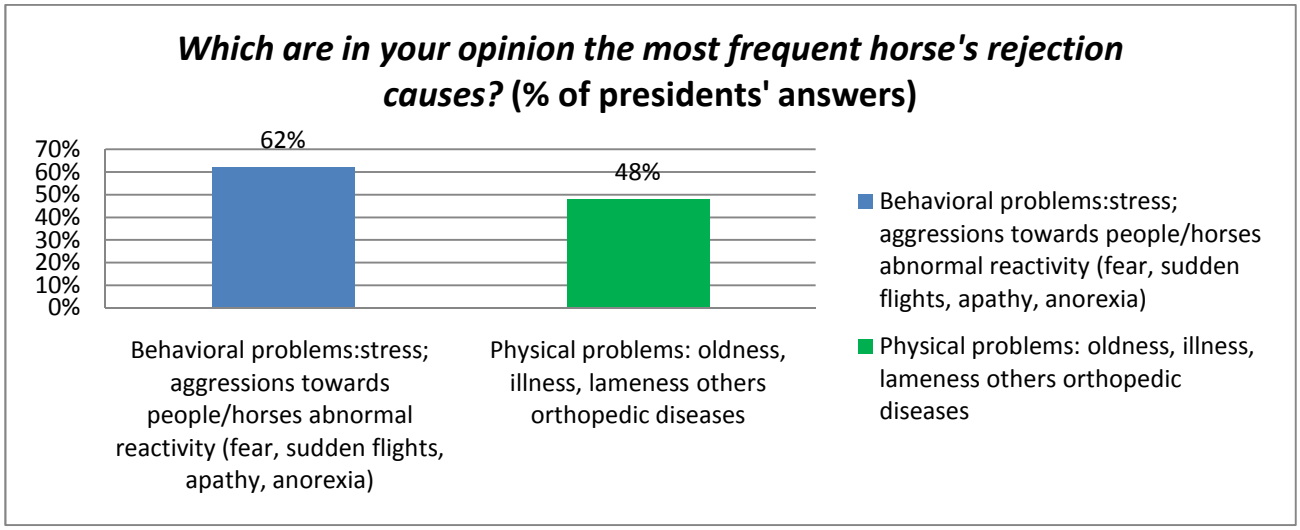


Fig.7.2: *Presidents' opinions concerning the most frequent causes of horses' rejection from TR activities*

7.2. TECHNICIANS' QUESTIONNAIRES:

34 questionnaires were filled by the technicians and analyzed. The detail of the number of questionnaire collected per each center and the detailed results of each item are reported in the tables at the end of the paragraph.

- ***SUBJECTIVE PERCEPTION OF TECHNICIANS CONCERNING HORSES*** *(General/specific attitude and interest towards horses and perception of equine welfare)* (15 items)

The attitude of the TR technicians towards the horses used in TR activities was evaluated mainly through the ***item 1***. 70,59% of the technicians considers the horse a excellent "therapeutic tool" and declared that the most important quality is the obedience of the animals (having defined completely or almost true the sentence " the horse could be an excellent therapeutic tool provided that has been well trained to obey to the orders"). 97,0% of them declares that the horse is a "perfect relationship mediator" and 91,18% defined the horse "an excellent partner for human beings *per sè* for his behavioral and physical characteristics" (the percentage reported are those that classified the above mentioned sentences as completely or almost true).

The **high interest** and the **general positive beliefs towards horse** is confirmed by the totality of the operators declaring to be interested in improving their skills and knowledge about horse (100% defined the sentence completely or almost true) and in improving their relationship with the horses, and by this to increase their results and satisfaction in their job (97,06%).

In relation to their believes in regard to the outcomes arisen from the relationship with horses, while 100% believes that it could enrich the life of people (sentence classified as certainly or almost true), the main part do not thinks that it could be the case for the animal counterpart.

In fact **70,58%** at all considers that the sentence **"this job could enrich the life of the animals involved"** is either **not always true or almost/totally false** (respectively 29,41% and 41,17%).

Furthermore the demands of TR activities are considered to be in general not completely acceptable by the **58,82%** of the technicians interviewed (32,35%

and 26,47% of them respectively defined the **acceptability** to be either **not always true or almost/certainly false**).

However noteworthy, despite the negative believes about the impact of this activity to the horses, in general the technicians do not think that this fact could affect the animal welfare, and therefore their good attitude towards the therapeutic job, since:

76,47% defined the **horses** in the centers to be very much, much or fairly **contented** (***item 5.12***);

88,23% defines their **safety and rely** level to be very much, much or fairly **good** (***item 5.11***);

82,35% of the technicians, as concerns the **husbandry** of the horses and their **general management** it is considered to be **adequate** to the animal's needs by the (***item 5.10***).

- ***OBJECTIVE/SUBJECTVE PARAMETERS TO EVALUATE THE QUALITY OF HUMAN-HORSE RELATIONSHIP*** *(possible critical aspects or problems during TR sessions)* (25 items)

Some critical aspects in the relationship of the technicians with the horses may be revealed by some horse's behaviors (***item number 2, all***).

These behaviors were reported by the technicians as "problematic situations interfering with their job. The most notable behaviors in this sense are the **aggressive behaviors** (see fig.7.3 and 7.4). Threats **towards people** displayed by the horses and defined as very much, much or fairly interfering with the job by 38,23% of the interviewed and defined as slightly interfering by 5,89% (TOT 44,12%). Furthermore 8,82 % of the technicians reported aggressive behaviors (bites, kick *etc.*) towards people as "very much, much or fairly interfering" with TR sessions while a further 17,65% of them referred to these behaviors as "slightly interfering" with the TR job (TOT 26,47%).

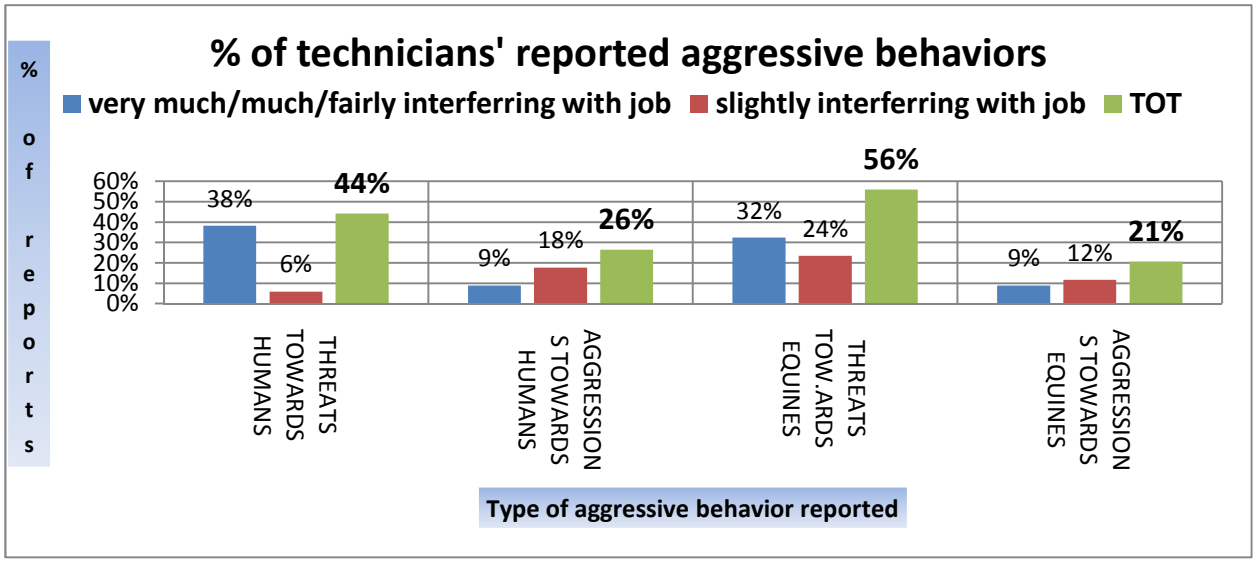


Fig.7.3: ***% of technicians' answers concerning aggressive behaviors as interfering with their job***

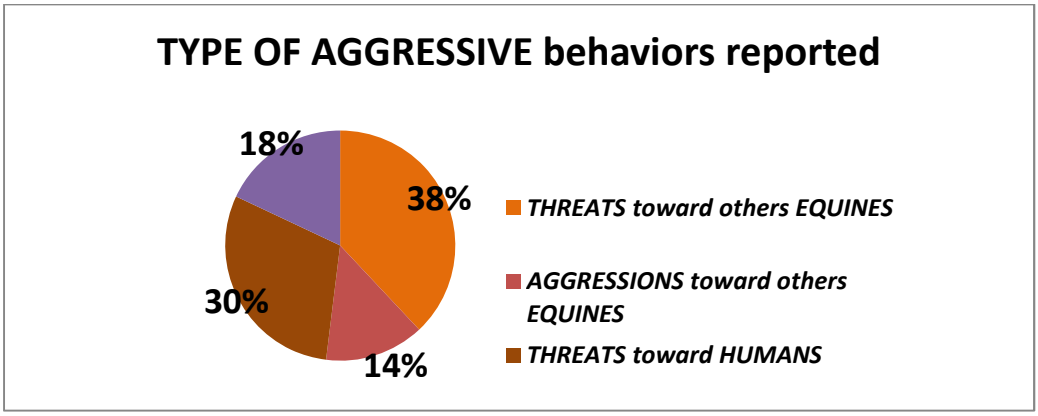


Fig.7.4: ***Relative aggressive displays on the TOTAL "disturbing" aggressive behaviors reported by technicians***

Aggressive behaviors **towards con-specifics** threatening behaviors were referred to interfere with TR sessions very much/much by 32,35% and slightly by 23,53% (TOT 55,88%); attacks directed to other horses were declared to interfere with TR activities very much/much by 8,82% and slightly by 11,76% (TOT 20,58%) (for a comparative vision of the aggressive behaviors reported see fig 7.4).

As concerns the others behaviors defined as very much, much or fairly disturbing the TR activities, the most consistent (58,82%) is assigned to **unwanted and repeated stop** "repeatedly and un-appropriately" (which is also defined as slightly disturbing by a further 11, 76%) (TOT 70,58%). Another behavior that could be led also to the same level of explanation

(lack of stimuli and repetitiveness) is the **refusal to stand** (while getting on or other moments); it is referred by the 11,76% as very much/much and by a further 20,59% as slightly interfering with the job (TOT 32,35%). Moreover to the same level of explanation may be led the **un-wanted behaviors while getting on** (to threat, to bite, other), which were referred by the 8,82% as "very much/much" and by the 32,85% as "slightly" interfering with the TR activities (TOT 41,17%).

Others behaviors reported refers to a **lack of respect of the personal space of the people** by pulling and pushing people (20,59% and 35,3% respectively much /very much and slightly interfering with the job) (TOT 55,89%) or walking on human feet (14,7% and 26,47% very much/much and slightly interfering respectively) (TOT 41,17%).

A further category of behaviors reported as disturbing the sessions might affect the human horse relationship. This category of behaviors, as mentioned about the abnormal behaviors, may also reveal possible **frustration/conflict/constraint/physical pain or emotional un-balance** of the horses. They include: sudden flight or jump (17,75 % very much/much and 28,23% slightly interfering) (TOT 55,98%); sudden and repetitive head lowering (17,65% very much/much and 26,47% slightly interfering)(TOT 44,12%); head shake or others movement with the head (17,65% very much/much and 17,65% slightly interfering)(TOT 35,3%); to buck (20,59% very much/much and 2,54% slightly interfering) (TOT 23,53%). The last reported behavior (that might per sè be a possible index of some critical aspect in the job) was refusal to go into the arena or to go out of the stable; this behavior was referred to interfere very much/ much by the 8,82%% (TOT 8,82%) (the whole "disturbing" behaviors are reported in fig. 7.5).

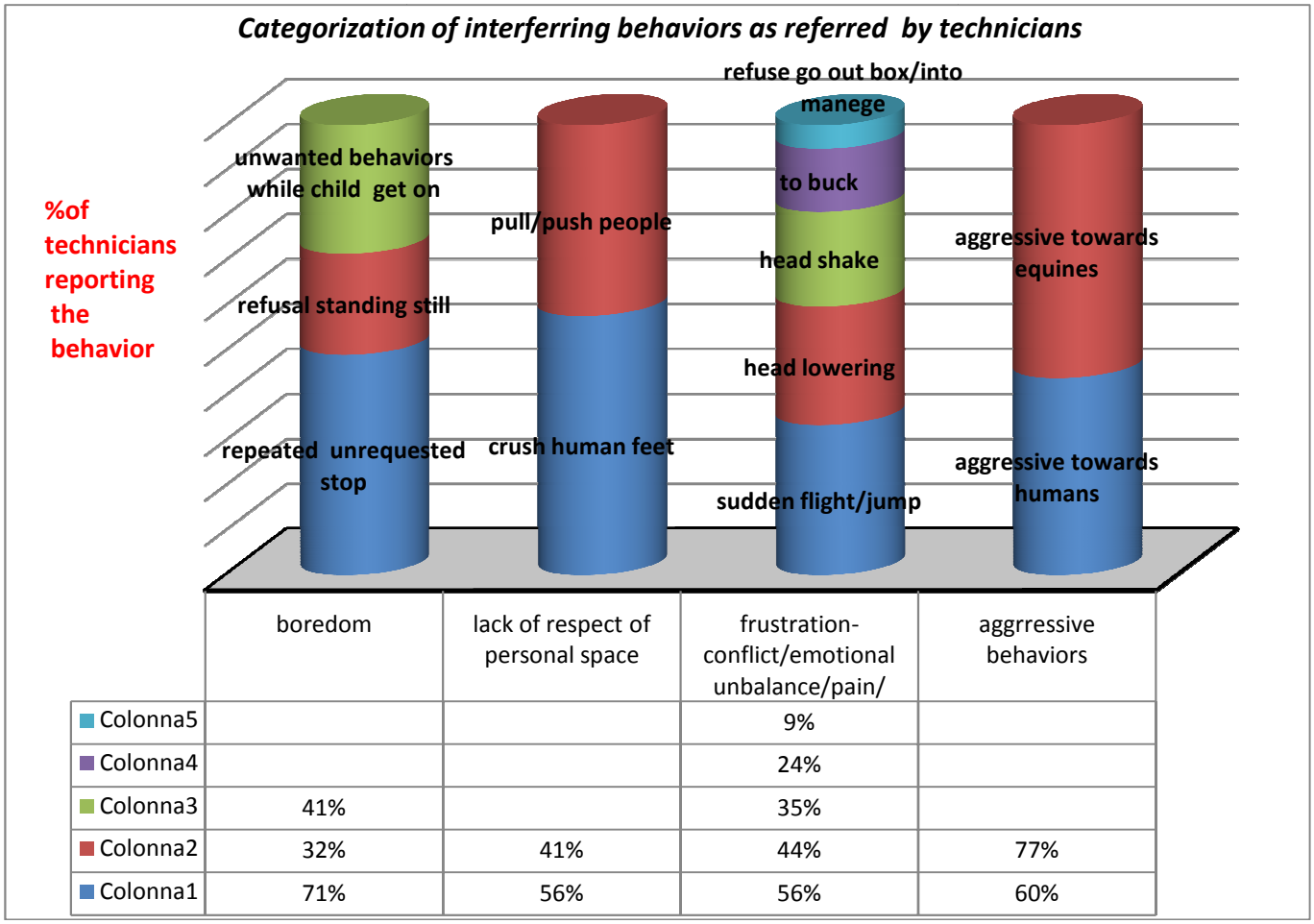


Fig.7.5: ***Problematic behaviors reported by the technicians and their underlying possible categorization (behaviors are reported as % of technicians' answers)***

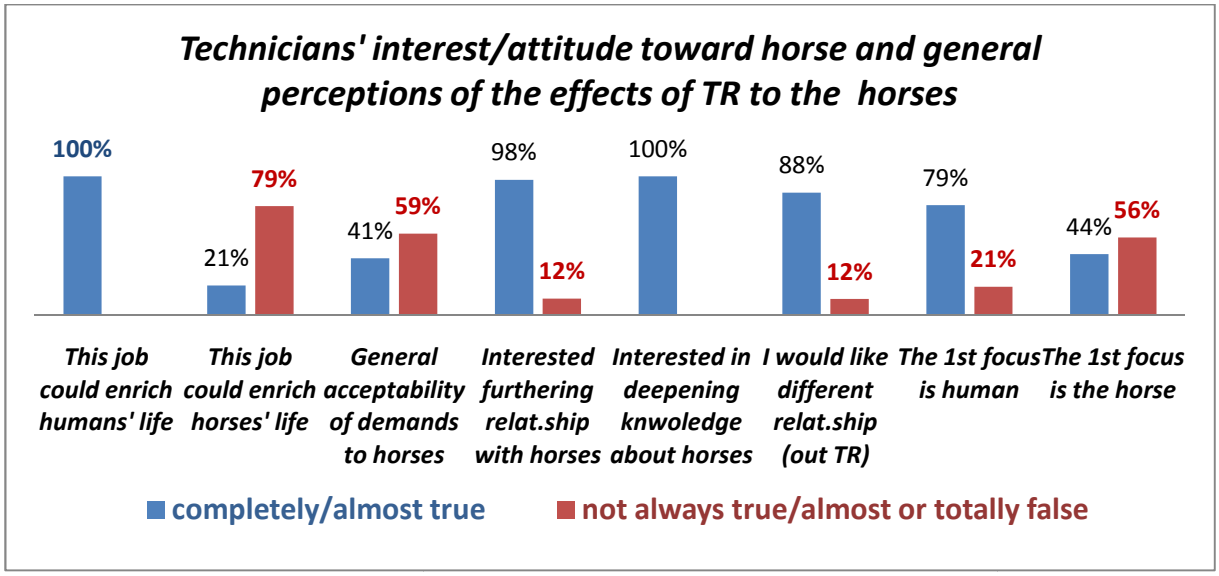


Fig. 7.6: ***Technicians' positive attitude/interest towards horse and general negative emotional attitude concerning TR outcomes to the horse***

Besides the horse's behaviors were evaluated also further parameters concerning human-horse relationship (see fig.7.6 and fig.7.7): technicians'

behavior/habits towards horses and technicians' perception about their relationship with horses (subjective and objective index of the quality of human-horse relationship):

In the ***item 1.15*** they declared: "*I would like to have with the horses I use in my job a different sort of relationship, out of TR context*"; sentence that was considered completely or almost true by 88,23% of the technicians. Moreover while 79,41% considers the sentence "*the most important focus is the human patient* " (***item 1.12***) to be certainly or almost true, the opposite sentence ("the most important focus is the horse") (***item 1.11***) is defined certainly or almost true only by 44,12%, being considered by 55,88% either not always true or almost/completely false.

The ***items 3 and 4*** were aimed to investigate the quality of the relationship, by exploring the QUALITY/QUANTITY OF JOB ON THE GROUND: As concerns the average duration of job on the ground, the technicians were asked about which was the medium amount of time they spent handling with the patient (the question was referred to a type-lesson, leaving apart from the different kind of problematic and from particular casuistry).44,12% answered that the time spent handling was 0-5% of the whole lesson; 35,3% up 25% of the lesson; 11,76% up to 50% of the lesson's length and 8% more than 50%. Considering that in the centers the average length of a TR sessions was 35 minutes, therefore **the average time spent handling** was around 1,75 min for the main part of the patients (44,12%). Another notable percentage (35,3%) declared to spend around 8,75 min handling. A further 19,76% declared to spend either more (more than 50% of the lesson's length) or the same time spent riding for the handling. 79,41% of the technicians declared to **use for the handling only some of those horses available** (while they do not use the others cause they don't trust them or they are considered do not tolerate it). This answer agree with the ***item 1.4***, where 50% of the technicians declared "*I trust only one (or more) horse(s), while I use (for the whole therapeutic activity included the riding part) the others only if I really need*".

Noteworthy, as already said about the item ***5.11***, when asked about the level of **safety and rely** of the horses of the centers the technicians have judged it very much/much or fairly convenient to their job (88,23% of the answers). The same direction has the ***item 5.2*** "*are you satisfied about the* ***mutual understanding*** *with the horses*?", which has had 76,47% of technicians answering very much/much/fairly.

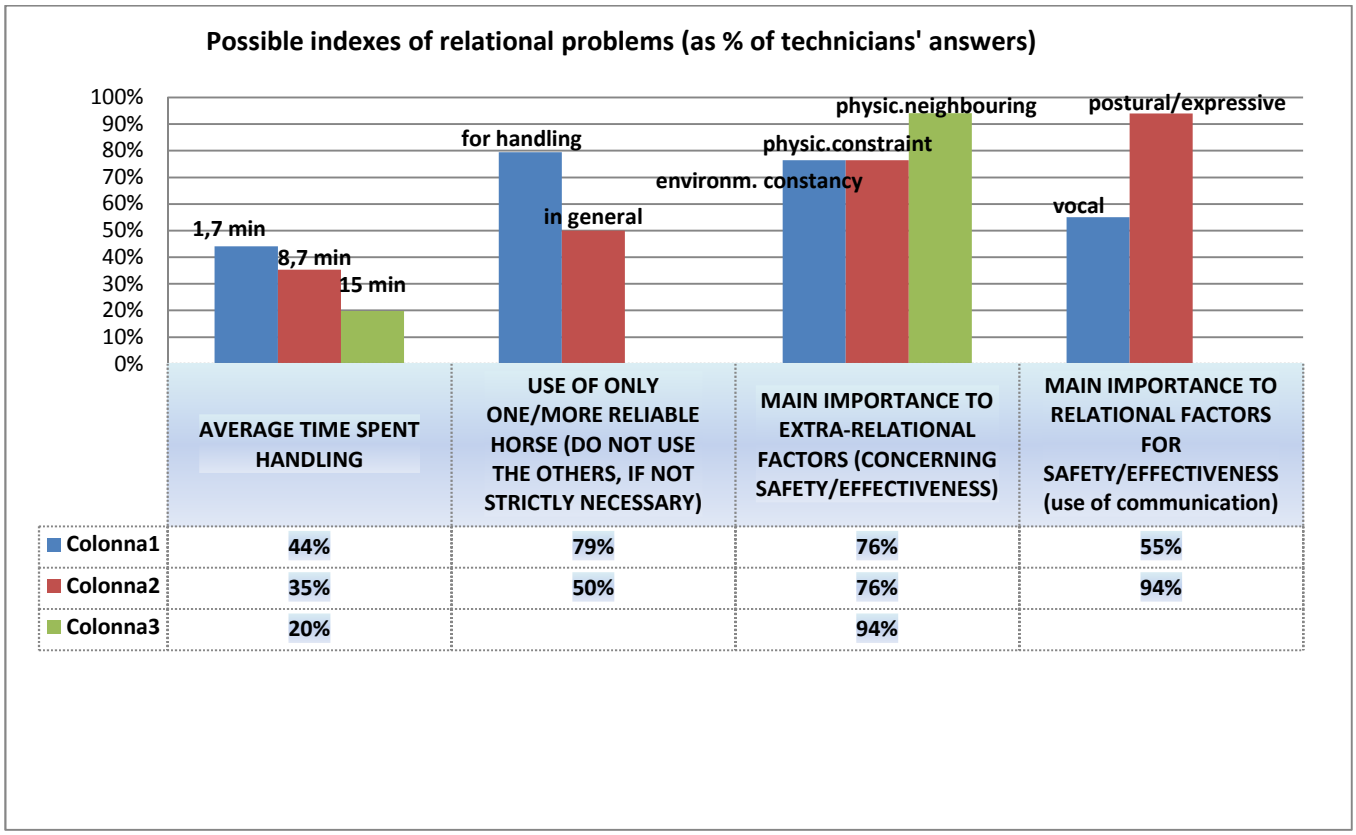


Fig 7.7: ***Possible symptoms of relational difficulties (% of TR technicians interviewed)***

Moreover the examination of the relevance of the different aspects conditioning safety and rehabilitative effectiveness in the use of horse, it is interesting to notice that high importance is given to some **factors that are external to the relationship**. These aspects regard the setting ("properly prepared: more predictability and constancy of physical and human environment") and the **physical control/ restraint** of the horses and **physical neighboring** between the operator and the horse (to physically intervene if necessary) indicated to be very much/ much relevant respectively by the 76,48% and 76,47% 94,12% of the technicians.

However at the same time some **relational factors** are believed to be important, as concern safety and rehabilitative efficacy: in fact respectively 55,8% and 94,12% of the operators declared the use of vocal and the postural/expressive communication with horse very much/much important to improve the above mentioned aspects.

- ***TECHNICIANS' EMOTIONAL EXPERIENCED*** *(*General and specific emotional attitude; job-satisfaction level; group's dynamics, perception of training received adequacy*)* (16 items)

The ***items 5,6,7*** were all aimed to investigate some subjective perceptions related to the emotional attitude of the technicians; their job- satisfaction level; the group's dynamics; the perception of the adequacy of the training received.

As concern the **training's evaluation** (in relation to the use of horses) it is generally **positive** (declaring to have been very much/much/fairly informed) and the technicians declared to be satisfied as concern the mutual understanding with the horses (all the percentage of the different items being included between 73,93% and 94,53% of positive judgment).

However 50% of the technicians denounce a **lack of consistency of conduct** among the rest of the staff as concern the use of the horses.

Concerning the **group's dynamics,** collaboration and exchange degree, technicians' perception of their colleagues' approval level (towards their own job) they are general **positive**, the **job-satisfaction level is positive** as well (all the items were included between 67,65% and 91,18% of positive judgments).

As concern the **emotional state** 44,12% of the operators report that it has interfered in the relationship with their colleagues fairly, much or very much (item 6). Moreover in relation to some particular **negative emotional states** (feeling anxious, discouraged, frightened, unmotivated) it is interesting to notice that it has been considered having acted (at least sometime) through lowering: their concentration during job (50,03%); the quality of their job

(23,53%); the amount of time they have spent for it (8,82%). Moreover 70,59% of the technicians reported that these feelings did, at least sometime, cause some doubts about the results of their own job ("I think that I could empower the results of my job") and that those feelings did. at least sometime, cause to them an extreme and wearing mental effort (38,23%). The same result is shown by the ***item 1.16***, where 50% of the technicians defined certainly or almost true the sentence "often happens that I feel really relieved cause nothing bad has happened".

As concerns the "open" questions 21 operators (61,76% of the interviewed) answered the first one: "*as concern your experience do you think that there are some particular moments or type of activities more invasive for the TR horses?*" If yes could you detail which and why do you think so?
Among the answers 11 (52,38% of the answers) referred to the **monotony** of the activity and its **constrictiveness** and defined the animals as "switched off"; the technicians pointed out specific moments, such as the **getting on** or the **exercises and games**, as the main causes of boredom . As concern the other answers 5 of them (23,81%) referred to the **relational attitude of the patients** (inconsistency of their communication's content with the meaning perceived by the horse, "strong manners" etc.); 3 (14,28%) to the **physically** inadequacy level of this job (lack of quantity of movement), 2 (9,52%) referred to the high level of noises disturbing the horse.

As concern possible suggestions to improve the quality of the intervention (both for the child and the horse) among the 34 those interviewed 20 (58,82% of the whole technicians) answered to the question. 9 of them (45% of the answers) referred to the importance to attempt **to vary**, as much as possible, the type of work and exercise for the horses, 8 (40%) to the importance of a **more homogenous distribution** of the amount of work among all the horses kept in the centers and of adequate levels of **rest** for them; 2 of them (10%) highlighted the importance to consider also the **type of pathologies** that affect the patients working with the same horse (highlighting the importance to

vary as much as possible the possible negative input they are related with); 1 (5% of the answers) is referred to some pedagogical attitude that should be adopted from the technicians to preserve animal's welfare (to put in clear with the patients, as soon as possible. some basical respect-rules)and the need of more awareness (by the technicians) about the priorities (among which horse welfare should be more considered).

In the following tab. 7.5 are reported the detailed results of the President' and technicians' questionnaires:

TOTAL QUESTIONNAIRES COLLECTED:

PRESIDENTS QUESTIONNAIRES (P) (n= 8);

TECHNICIANS QUESTIONNAIRES (T) (n= 34)

DETAILS OF THE Number of Questionnaires collected in each center :

- *CENTER 1 (INVOLVED FOR FURTHER DIRECT DATA COLLECTING)* ***1 P +2 T***
- *CENTER 2 (INVOLVED FOR FURTHER DIRECT DATA COLLECTING)* ***1P +5 T***
- *CENTER3 (INVOLVED FOR FURTHER DIRECT DATA COLLECTING)* ***1P +7 T***
- *CENTERS "OTHERS" (not further involved)* ***5P+ 20 T***

AIMS OF THE SINGLE ITEMS:

- **PRESIDENT-QUESTIONNAIRES (TOT 20 Items):**

1. **GENERAL INFORMATIONS ABOUT THE CENTER AND ITS JOB**
   Items 1.1- 1.7
   (SubTOT 7)
2. **INFORMATION ABOUT THE HORSES**
   Items 2.1-2.4; 3.1-3.5; 3.8
   (SubTOT 10)
3. **PRESIDENT'S SUBJECTIVE PERCEPTIONS/BELIEFS**
   Items 3.6-3.7; 3.9
   (SubTOT 3)

- **TECHNICIANS-QUESTIONNAIRES (TOT 56 Items):**

1. **GENERAL AND SPECIFIC (IN TR CONTEXT) *ATTITUDE AND INTEREST* TOWARDS HORSES AND *PERCEIVED EQUINE WELFARE***
   1.1-1.3; 1.5; 1.7-1.14; 5.10; 5.12; 8
   (SubTOT 15)
2. ***QUALITY OF THE RELATIONSHIP* WITH THE HORSES AND POSSIBLE CRITICAL ASPECTS OR PROBLEMS DURING TR SESSIONS;**
   1.4; 1.6; 1.15; 2.1-2.14; 3; 4.1-4.6; 5.11
   (SubTOT 25)
3. **GENERAL AND SPECIFIC EMOTIONAL ATTITUDE; JOB- SATISFATION LEVEL; GROUP'S DYNAMICS, PERCEPTION OF TRAINING RECEIVED ADEQUACY**
   1.16; 5.1-5.9; 6; 7.1-7.5
   (SubTOT 16)

PRESIDENTS-QUESTIONNAIRES:

CENTER	AGE OF CENTER	TOT n. OF HORSES	AGE	SEX	HORSES' property	*HORSES*	BREED	LATEST REJECTION	Age	Cause	EARLIEST REJECTION	AGE	CAUSE	MOST FREQ. REJ CAUSE	HUSBANBRY	DECISION -MAKER	EXTRA-THER JOB	Structured/Constant TRAINING.	Structured SCREENING	USERS	MONTHS-ACTIVITY	N.-TECHNICIANS	USERS/TECHN	STAGER etc
CENTER 1		6	21	F	C	*5*	SHETLAND													100	11	3	33,3	0
	≥5		20	C	C	*5*		NONE REJECTED YET						NONE YET	YARD/ PAST GROUP ALW AYS	RID ISTR. (ALSO OWN)	PON CLUB	ONLY FIRST PERIOD BEFORE ENROL	NO: EVER Y-ONE RESP					
			18	C	C	*5*																		
			18	F	C	*5*																		
			13	F	C	*5*																		
			12	F	C	*5*																		
CENTER 2	≥15	7	21	C	C	*10*	TROTT	10 (NOT YET REJ)	21	NOT YET REJ	6 MONTHS	6	SUDDEN FLY; BUCK; AGGRESS. TOW OTHER HORSE	FEARS; PHYS DISABILITIES	BOX+ SINGLE PADD (AVER OUT 30 h/WEEK)	TR RESP; RID ISTR	RID SCH	ONLY SPORAD BY RID ISTR + ONCE FREE IN MANEG	NO	50	12	6	8,3	10
			18	C	RS	*1*	SI																	
			15	C	C	*1*	QUART																	
			15	F	RS	*2*	X																	
			14	C	C	*2*	FJORD																	
			12	C	RS	*1*	POLISH																	
			7	F	C	*1*	BARDIG																	

CENTER 3	≥5	3	14	C	C	7	AAS	ONLY ONE REJ 5 YEARS JOB	24	OLDNESS				STRESS; APATHY; OLDN.	SINGLE PADDOCK ALWAYS	TR RESP; VET	NO	NO SPOR RID. BY TECHN	NO	30	11	7	4,48	2
			13	C	C	3	TROTT																	
			6	C	C	1	AVEL																	
CENTER 4	1	3	22	C	RS	5	SI	NONE REJECTED YET						STRESS; ANOREXY	BOX+PADD: 2SIN 1GR (AV. OUT 6h/W)	TR RESP; RID ISTR	RID SC; 1 WALKS	NO	NO	9	8	2	4,5	5
			16	F	P	5	AVEL																	
			12	F	C	2	AVEL																	
CENTER 5	≥15	6	21	F	C	2	SI	10	31 YEARS	OLDNESS	6 MONTHS ACTIVITY	7	BEH INAPTITUDE (FLYGTS, THREATS)	STRESS; AGGRESSIVE BEH TOW HORS. OR PEOPL	BOX+ PADD GROUP AVER TIME OUT 72h/W	RESP HORSE (TECHN OWNER OF ANOTH STAB)	NO	YES TWICE A WEEK	YES BY REP HORSES	140	11	13	10,7	7
			17	F	C	12	AVEL																	
			15	F	C	7	TROTT																	
			15	C	C	1/2	X																	
			12	F	C	5	PONYFR																	
	≥15		10	F	P	6	PONYX																	
CENTER 6	≥5	3	21	F	RS	6	MAREM	6 YEARS JOB	22	OLDNESS	1	15	LAMENESS	STRESS; PHY ILLN; OLDN.	BOX	RID SCH OWNER	RID SCH	NO	NO	15	8	3	5	35
			18	C	RS	4	SI																	
			10	C	RS	1	AVEL																	
CENTER 7	≥10	11	21	F	C	2	LIPIZZ	10	X	X	6	X		ORTO	BOX +	TR	RID	NO	NO	140	12	12	11,6	10
			20	F	C	10	x																	

			18	C	C	*10*	AVEL	YEARS ACTIVITY			MONTHS			PEDIC DISEA	PADD (AVER OUT h/WEEK 9)	RESP; PROFESS. TRAINER; GROOM	SCH		ONLY FIRST 6 MONTHS BEF RECLUT						
			17	C	C	*6*	PAINT																		
			17	C	C	*1/2*	IRISH COB																		
			13	F	C	*4*	POLISH																		
			7	F	C	*1*	POLISH																		
			7	F	C	*2*	POLISH																		
			7	F	C	*2*	SI																		
			5	C	C	*3*	APPAL																		
			3	C	C	*1*	FALAB																		
CENTER 8	≥5	5	24	C	C	*7*	FJORD	ONLY ONE REJ TILL NOW AFTER 2 Y JOB	7	PHYSILLNESS				NO EXPER	BOX+PADD; GROUP (AVER OUT 38 h/WEEK)	TR RESP; VET; FEDERAL COMMITTEE	SPORAD TECHN HAVE RID LESSON THEM	NO	NO (EVERYONE IS RESP)	60	11	4	15	4
			21	F	C	*5*	X																		
			11	C	C	*3*	SHETL																		
			11	C	P	*5*	X																		
			10	C	C	*3*	TROTT																		
TOT:		5,5	14,06			*4,06*															68		6,25	11,61	9,12
STAND. DEVIAT:		2,72	5,3			*2,85*															52,8		4,2	9,55	11,03

TECHNICIANS-QUESTIONNAIRES:

1. THE FOLLOWING QUESTIONS ARE RELATED TO WHAT DO YOU BELIEVE ABOUT YOUR JOB WITH THE HORSES. PLEASE ANSWER TO EACH QUESTION CHOOSING THE ANSWER THAT IS NEARER TO YOUR CASE	Certainly true (1)	Almost true (2)	TOT % 1-2	Not always true (3)	TOT %3	Almost False (4)	Certainly false (5)	TOT %4-5
17) The horse could be an excellent therapeutic tool provided that has been well trained to obey to the orders	15	9	**70,59**	8	**23,53**	1	1	**5,88**
18) The horse is an excellent relationships-mediator	26	7	**97,06**	1	**2,94**			
19) The horse is an excellent partner for human beings per sè (for his behavioral and physical characteristics)	18	13	**91,18**	3	**8,82**			
20) I trust only one (or more) horse(s), while I use the others only if I really need.	8	9	**50**	7	**20,59**	2	8	**29,41**
21) Do you think that the demands of this job are acceptable to horses in general?	2	12	**41,18**	11	**32,35**	8	1	**26,47**
22) Every horse in my Center is a good horse (provided that he has been coupled to the right child),	11	10	**61,76**	9	**26,47**	2	2	**11,76**
23) This job could enrich the lives of people	32	2	**100**					
24) This job could enrich the lives of animals	4	6	**29,41**	10	**29,41**	10	4	**41,17**
25) I would like to deepen my knowledge about horses	27	7	**100**					
26) I would like to improve my relationship with them and by this having best results and satisfaction in my job	24	9	**97,06**	1	**2,94**			
27) The most important focus is the horse	10	5	**44,12**	12	**35,29**	7		**20,59**
28) The most important focus is the human patient	13	14	**79,41**	7	**20,59**			
29) I don't care about the horses: I trust who manage and trained them	2	7	**26,47**	10	**29,41**	8	7	**44,12**
30) I would like to further the relationship with the horses I use	26	7	**97,06**	1	**2,94**			
31) I would like to have with the horses used in my job a different sort of relationship (out of TR context)	25	5	**88,23**			3	1	**11,76**
32) Often happens that I feel really relieved cause nothing bad has happened	8	9	**50**	8	**23,53**	2	7	**26,47**

2. ***HOW MUCH THE FOLLOWING HORSE' BEHAVIORS HAS INTERFERED WITH YOUR JOB?***	**Very much (1)**	**Much (2)**	**Fairly (3)**	**SubTot %** **1-3**	**Slightly (4)**	**SubToT %** **4**	**TOT %** **1-4**	**Nearly nothing (5)**	**Nothing (6)**	**TOT %** **5-6**
3. To walk on human feet		1	4	14,70	9	**26,47**	**41,17**	14	6	58,82
4. Pull or push people		2	5	20,59	12	35,30	**55,89**	11	4	44,12
5. To stop repeatedly and un-appropriately		10	10	58,82	4	11,76	**70,58**	8	2	29,41
6. To threat people	1	4	8	38,23	2	5,89	**44,12**	8	11	55,89
7. To threat other horses	1	2	8	32,35	8	23,53	**55,88**	12	3	44,12
8. To attack people (kicks or bites)		1	2	8,82	6	17,65	**26,47**	10	15	73,53
9. To attack other horses (kicks, strikes, bites)		2	1	8,82	4	11,76	**20,58**	17	10	79,41
10. Sudden flight or jump	1	1	4	17,75	13	38,23	**55,98**	12	3	44,12
11. To buck		2	5	20,59	1	2,94	**23,53**	11	15	76,47
12. Lower suddenly the head	1	1	4	17,65	9	26,47	**44,12**	9	10	55,88
13. Other movements with the head			6	17,65	6	17,65	**35,30**	11	11	64,70
14. To refuse to go into the arena or to go out from the stable					3	8,82	**8,82**	9	22	91,18
15. Un-wanted behaviors while getting on (to threat, to bite)	1		2	8,82	11	32,35	**41,17**	8	12	58,82
16. To refuse to stand (while getting on or other moments)	1	1	2	11,76	7	20,59	**32,35**	17	6	67,65

3. ***WHICH IS THE MEDIUM AMOUNT OF TIME SPENT HANDLING DURING A LESSON BY THE PATIENT(THE QUESTION IS REFERRED TO A TYPE-LESSON, LEAVING APART FROM THE DIFFERENT KIND OF PROBLEMATICS AND FROM PARTICULAR CASUISTRY)***	**0-5 % (1)**	**Up to 25% (2)**	**Up to 50% (3)**	**More than 50% (4)**
	15	12	4	3
%	**44,12%**	**35,3%**	**11,76%**	**8,82%**

4. ***WHICH SCORE WOULD YOU GIVE TO THE FOLLOWING ASPECTS (AS CONCERNS THEIR RELEVANCE IN TERM OF SAFETY AND REHABILITATIVE EFFECTIVENESS?***	**Very much (1)**	**Much (2)**	**Fairly (3)**	**TOT % 1-3**	**Slightly (4)**	**TOT % 4**	**Nearly nothing (5)**	**Nothing (6)**	**TOT % 5-6**
1) I use for the handling only some of those available (while I do not use the others cause they do not tolerate it or I don't trust them)	11	8	8	**79,41**	2	**5,89**	3	2	**14,7**
2) Setting properly prepared (more predictability and constancy of physical and human environment)	15	3	8	**76,48**	7	**20,59**	1		**2,94**
3) Physical-control tools: to work with horses enough tightly restraint or tied up, if the horse is free to make sure that there are appropriate safety measures (fences, walls etc)	3	12	11	**76,48**	3	**8,82**	3	2	**14,70**
4) Physical neighboring between the operator and the horse (to physically intervene if necessary)	12	13	7	**94,12**	1	**2,94**		1	**2,94**
5) Use of the voice to point out to the horse the requested and the unpleasant behaviors)	6	7	6	**55,88**	10	**29,41**	4	1	**14,70**
6) Use of expression and posture to point out to the horse the requested and the unpleasant behaviors)	11	15	6	**94,12**	1	**2,94**	1		**2,94**

5. ***PLEASE ANSWER THE QUESTIONS GIVING A SCORE TO EACH :***	**Very much (1)**	**Much (2)**	**Fairly (3)**	**TOT % 1-3**	**Slightly (4)**	**TOT % 4**	**Nearly nothing (5)**	**Nothing (6)**	**TOT % 5-6**
1) Have you been informed about the best way to enter into relation with the horses that you are using?	12	16	4	**94,12**	2	**5,89**			
2) Are you satisfied about the mutual understanding with the horses?	5	11	10	**76,47**	8	**23,53**			
3) Do you think that there is enough consistency of conduct among the staff in regard to the use of the horses?		10	7	**50**	11	**32,35**	5	1	**17,65**
4) Do you think that the training that you have had about the involvement of the horse in TR is enough?	5	11	12	**82,35**	5	**14,79**	1		**2,94**
5) Do you believe that the involvement of all the operators on regard to the items related to horses is enough?	4	14	7	**73,53**	4	**11,74**	4	1	**14,70**
6) Do you believe that in your staff the level of collaboration and exchange is enough?	6	12	5	**67,65**	5	**14,70**	5	1	**17,65**
7) Do you consider to be satisfied about the goals obtained in your job dur. the last six months?	7	15	9	**91,18**	3	**8,82**			
8) Do you consider to be satisfied about your job in general (economically too)	5	10	14	**85,29**	5	**14,70**			
9) Do you think that your staff judges positively your job?	4	8	12	**70,59**	9	**26,47**	1		**2,94**
10) Do you think that the husbandry of the horses used in your center is appropriate to their needs?	4	10	14	**82,35**	4	**11,76**	1	1	**5,88**
11) Do you believe that the level of safety and rely of the horses in your center is convenient for their job?	8	12	10	**88,23**	1	**2,94**	2	1	**8,82**
12) Do you think that the horses of your center are contented?	5	11	10	**76,47**	5	**14,70**	3		**8,82**

6. ***DURING THE LAST YEAR HOW MUCH YOUR EMOTIONAL STATE HAS INTERFERED WITH RELATIONSHIP WITH THE OTHER TR TECHNICIANS?:***	**Nothing at all (1)**	**Slightly (2)**	**Fairly (3)**	**Much (4)**	**Very much (5)**
	6	**13**	**6**	**8**	**1**
	17,65	**38,23**	**17,65**	**23,53**	**2,94**

7. ***DURING THE LAST YEAR HOW OFTEN DID YOU NOTE THE FOLLOWING PROBLEMS DUE TO PARTICULAR EMOTIONAL STATE (such as feeling anxious, untrusth, frightened, unmotivated)?***	**Always (1)**	**Dur the main part of my time (2)**	**TOT %1-2**	**Somet ime (3)**	**TOT % 3**	**Nearly never (4)**	**Never (5)**	**TOT % 4-5**
1) It has shortened the amount of time spent for my job				10	**8,82**	3	21	**91,18**
2) It has lowered the quality of my job		2	**5,88**	6	**17,65**	13	13	**76,47**
3) I have had a reduction in my power of concentration during job		3	**8,82**	11	**41,18**	10	10	**58,82**
4) To think that I could empower the results of my job	3	4	**20,59**	17	**50**	6	4	**29,41**
5) I felt that it has caused to me an extreme and wearing mental effort	1	3	**11,76**	9	**26,47**	9	12	**61,76**

8. AS CONCERNS YOUR EXPERIENCE DO YOU THINK THAT THERE ARE SOME PARTICULAR MOMENTS OR CHARACTERISTICS OF THE ACTIVITIES MORE INVASIVE FOR THE TR HORSES (BETWEEN THOSE THAT YOU NORMALLY DO)?	
NOICES	**2**
GETTING ON	**2**
"STRONG" STIMULI (RELATIONAL)	**1**
CONSTRAINT WORK	**1**
MONOTONY EXERC AND WORK	**8**
RELATIONAL ATTITUDE OF CHILDREN	**3**
INADEQUACY OF PHYSICAL EXERCISE	**3**
INCONSISTENCY OF REQUEST BY SOME CHILDREN (EG BLIND)	**1**

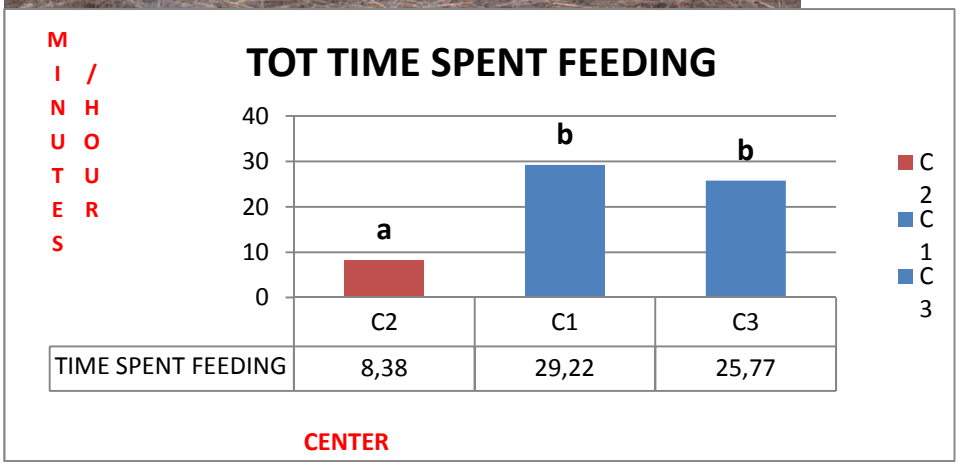
9. HAVE YOU ANY SUGGESTIONS ON HOW TO IMPROVE WHAT WE DO FOR BOTH THE PATIENT AND THE HORSE?	
IMP OF TURNOVER AND REST	**8**
TO SETTLE CLEAR RULES FOR CHILDREN (AIMED TO HORSES' RESPECT)	**1**
DO VARIATE TYPE OF WORK AND EXC	**9**
DO VARAITE TYPE OF DISABILITIES FOR THE SAME HORSE	**2**

7.3. ETHOLOGICAL EVALUATIONS DURING PRE-MEAL/REST:

The total focal sampling (conducted in C1,C2,C3) were 48 (24 pre-meal + 24 rest); the total time of observations was 124,3 hours (mean per horse 3,8h ± 0,7).
The behaviors recorded were calculated as mean behaviors/hour within each center, both during rest and during pre-meal (see tab.7.6 and tab. 7.7) Therefore the total (during both the situations) mean behaviors/hour performed in each center was calculated (tab. 7.8) and these data have been compared to reference values (related to feral or domestic horses kept in conditions letting them performing "natural time budget") (Kiley-Worthington, 1987). We compared data collected with references time budget, related to wild and to domestic horses kept in different environmental conditions allowing to horses more or less natural time budgets. To compare our data with the references' we reported the referred values, (reported by the Authors as % of horses' time budget within time periods of observations that varied between 2-24 h), to 1 hour. We included in the reference a study conducted on mares housed in looses boxes during the night and in a bare paddock in a high-density herd (200 mares/ha) of 44 Arab mares.
Therefore we could compare our data with references that could cover a range of situations, leading from the lowest to the highest "naturalness" of time budget (see tab. 7.9).
We report the results of the comparison of the total (pre-meal +rest) average behaviors of each center to the reference values (see tab.7.13 for a comparative view of all the behaviors). The results of the comparison of the three centers, concerning the average behaviors during the two different situations (pre-meal and rest) are reported too:
Minutes feeding:
The total time spent feeding in C1 (average min.-feed./hour = 29,22) and C3 (25,77) didn't largely differ from references values (27-37); instead it was significant different ($P<0,05$) compared to C2, where total time spent feeding was sensibly lower (9,03).

A low food availability is highlighted in all the three centers at the time periods preceding the meals this data depends on the rationing of the forage, that was administered twice a day in the first center (C1), three in the others (C2, C3). Anyway the total time spent feeding in the 24h time budget depend on the amount of forage fed and therefore its availability within 24 h (and on pasture availability, for C1); this quantity varied considerably among the three centers, in fact during rest observation (and therefore at least 1,5 hours distant from meal) the time spent feeding was:51,94 (C1); 12,37 (C2); 43,57 (C3).

Fig.7.8: ***Feeding behaviors' social facilitation and differences in feeding time among the centers***



Other maintenance

The lowest maintenance (drinking; defecating; urinating; lying; rolling) total value was assigned to C2 (0,45), that was significantly

Fig. 7.9: *Rolling by C2-horse: behavior whose absence might be related to poor welfare/anxiety*

lower compared to C1 and C3 (P<0,05).

Behaviors commonly described in domestic groups (from 0,4% to 5% of time budget) (Boyd, 1988; Duncan, 1980; 1985), such as lying down and rolling were totally missing during focal samplings in C2, while in C1 their absolute frequency was respectively 7;5 (C1) and 5; 6 (C3) (see fig.7.9).

Within all the three groups these behaviors were less performed during pre-meal observations, being much lower in C2; moreover while they sensibly increased in C1 and C3 in C2 they still remained low during rest

Self directed behaviors.

Total self directed behaviors frequency was the highest within C1 (1,62±1,57), lower within the others centers (C2=0,911±,99; C3=0,80±,2), even of this difference was not statistically significant (P>0,05). Reference value is reported within high density/low forage availability housed mares being 0,6± 2,1.

Movement:

Total movement was significantly lower in C2 compared to C3 and C1 (P<0,05) (C3=4,951±,51; C1=4,751,4±2) than in the latter (C2=0,65±0,50) (Fig.7.10). Reference values did vary from 1,6 (pregnant Shetland mares observed during nocturnal time periods) to 7,6 in pasture kept/wild horses; noteworthy within high density low forage availability housed mares its value was 16,7.

During rest it increased in C3, while it decreased in C1 and C2, compared to the movement observed during pre-meal.

Tab .7.6: *Average behaviors/hour at rest (*±SD) (tot time of observations 62,5 hours)

PRE-MEAL BEHAVIORS	AVER BEH X HORSE/HOUR *C1*	AVER BEH X HORSE/HOUR *C2*	AVER BEH X HORSE/HOUR *C3*
min FEEDING	6,5 2,66	4,41 3,72	7,97 3,97
Others MANTEINANCE	0,87 0,43	0,40 0,44	0,98 0,49
SELF DIRECT freq	1,97 2,00	1,49 2,76	0,89 0,14
MOVEMENT freq	5,5 1,72	0,99 0,46	4,39 2,00
TOT STICKY BEH freq	1,67 1,52	0	Not Determinable
TOT SPLIT BEH freq	4,37 1,57	9,63 3,13	ND
a) threats	1,57 1,32	2,79 1,64	ND
b) aggressions	0,6 0,17	6,11 3,27	ND
STICKY/SPLIT	0,38	0	ND
min STAND	27,5 9,91	46,22 11,35	31,3 9,65
a) drowsy	17,67 5,75	8,03 10,61	14,31 8,79
b) not drowsy	9,83 7,28	37,48 9,38	16,99 6,66
ALERT freq	1,97 0,56	2,76 1,35	6,02 2,27
STEREOT and or ABN BEH freq	0,17 0,32	9,58 3,80	3,33 3,50

Tab.7.7: *Average behaviors/hour performed during pre-meal (*±SD) (tot time of observations 62,5 hours)

REST BEHAVIORS	AVER BEH X HORSE/HOUR *C1*	AVER BEH X HORSE/HOUR *C2*	AVER BEH X HORSE/HOUR *C3*
min FEEDING	51,94 ±9,51	12,37 ±3,97	43,57 ± 4,45
Others MANTEINANCE	1,67 ±0,76	0,56 ±0,32	2,02 ±0,94
SELF DIRECT freq	1,3± 1,06	0,33 ±0,36	0,7± 0,23
MOVEMENT freq	4 ±0,37	0,31± 0,26	5,5 ±0,88
TOT STICKY BEH freq	1,06± 0,77	0,44 ±0,62	ND
TOT SPLIT BEH freq	1,99 ±1,10	5,14 ±3,87	ND
a) threats	0,56± 0,75	2,96 ±3,01	ND
b) aggressions	0,17 ±0,18	1,21± 0,85	ND
STICKY/SPLIT	0,532	0,085	ND
min STAND	9,56 ±4,41	50,83 ±7,38	20,31± 2,28
a) drowsy	6,11 ±3,10	6,94 ±2,43	11,55±6,75
b) not drowsy	3,44 ±1,85	43,89 ±6,78	8,76 ±7,52
ALERT freq	1,22 ±0,81	1,10 ±0,35	3,02± 2,29
STEREOT and or ABN BEH freq	0	4,35 ±2,11	0

Tab.7.8:.*Total average behaviors/hour (pre-meal+rest) performed (*±SD) (total time of observations 124,3 hours)

TOT PREMEAL+REST	AVER BEH X HORSE/HOUR *C1*	AVER BEH X HORSE/HOUR *C2*	AVER BEH X HORSE/HOUR *C3*
min FEEDING	29,22 ±24,65	8,38 ±5,54	25,77 ±19,86
Others MANTEINANCE	1,27± 0,72	0,45 ±0,38	1,50 ±0,88
SELF DIRECT freq	1,62 ±1,57	0,91 ±1,99	0,8 ±0,2
MOVEMENT freq	4,75 ±1,42	0,65 ±0,50	4,95± 1,51
TOT STICKY BEH freq	1,36 ±1,19	0,22 ±0,48	ND
TOT SPLIT BEH freq	3,29 ±1,81	7,39 ±4,11	ND
a) threats	1,06 ±1,15	2,87 ±2,33	ND
b) aggressions	0,13±0,17	3,66 ±3,43	ND
STICKY/SPLIT	0,41	0,02	ND
min STAND	18,53 ±11,89	48,53± 9,50	25,8± 8,69
a) drowsy	11,86 ±7,47	7,48 ±7,42	12,93 ±7,17
b) not drowsy	6,64± 6,06	40,69 ±8,54	12,88± 7,79
ALERT freq	1,59± 0,77	1,93 ±1,28	4,52 ±2,62
TOT STEREOT and or ABN BEH freq	0,09 ±0,23	6,96 ±4,01	1,67 ±2,87

Tab.7.9: *References values of time budget: at the left of heavy-type black line the lowest "naturalness". Going towards right the data are referred to more natural conditions (at the top right wild conditions).*

	REFERENCE VALUE					
BEHAVIOR	Benhajaly et al, 2008. 44 high densely housed arabian mares; PADDOCK	Boyd *et al* 1988; Przewalsky: 5fem. 1stall. 2 fillies-24 h time-budget; ZOO-PASTURE	Houpt *et al* 1986; Shetland ponies: 26 ponies; pasture-6pm-6am observations; PASTURE	kiley-Worthington 1987; 2009; 13 mixed age/sex part-arabian/pure arabian horses; mixed ages sexes; PASTURE	Duncan 1980; Camargue; 9-15 animals; 24h time budg.; FERAL	Duncan 1985; Camargue; 8 animals;24 h time budget; FERAL
min FEEDING	**15,5**	**27,8**	**33 - 41,4**	**34,2**	**32,4 - 37,8**	**33 - 37,8**
SELF DIRECT freq	**0,6+/2,1**	**NR**	**NR**	**NR**	**NR**	**NR**
MOVEMENT freq	**16,7**	**4,44**	**1,62 - 2,82**	**NR**	**4,8 - 6,6**	**3,1 - 7,6**
TOT STICKY BEH freq	**0**	**NR**	**NR**	**1,8**	**NR**	**NR**
TOT SPLIT BEH freq	**2,5+/-1,4**	**NR**	**NR**	**1,6**	**NR**	**NR**
min STAND		**21,8**	**23**	**13,8**	**13,2 - 22,2**	**9,9 - 18,3**
a) drowsy	**14,5**	**9,4**	**19,8**	**nr**	**9,6 - 13,8**	**6,6 - 13,2**
b) not drowsy	**8,9**	**12,4**	**13,2**	**nr**	**3,6 - 8,4**	**3,3 - 5,1**
Stereot/abn fre	**NR**	**0**	**0**	**0**	**0**	**0**

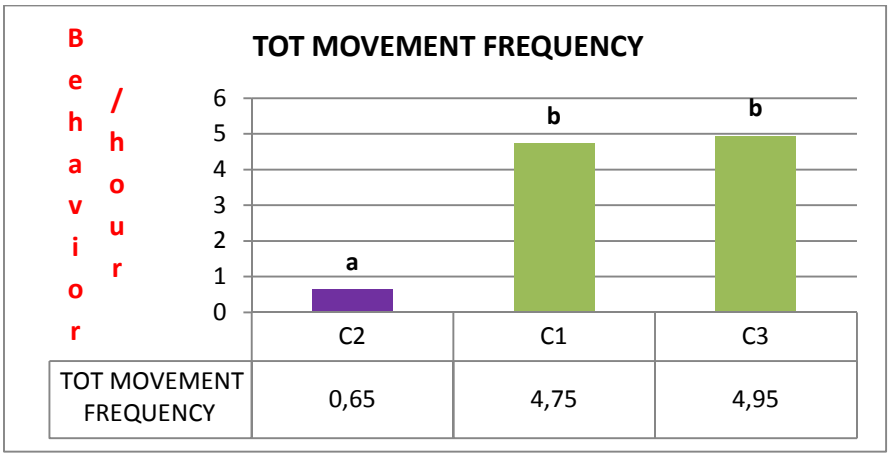


Fig. 7.10: *Average frequency of movement in each stable*

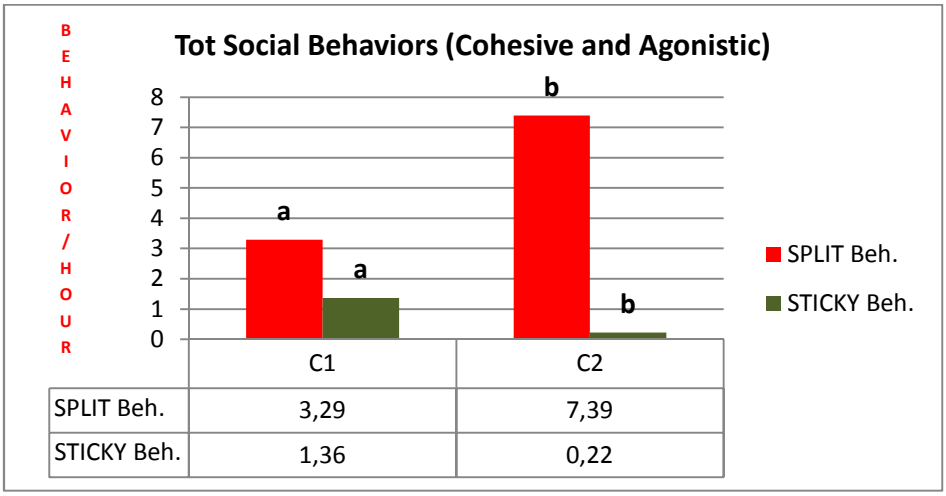


Fig. 7.11: *Social behaviors in C1 and C2*

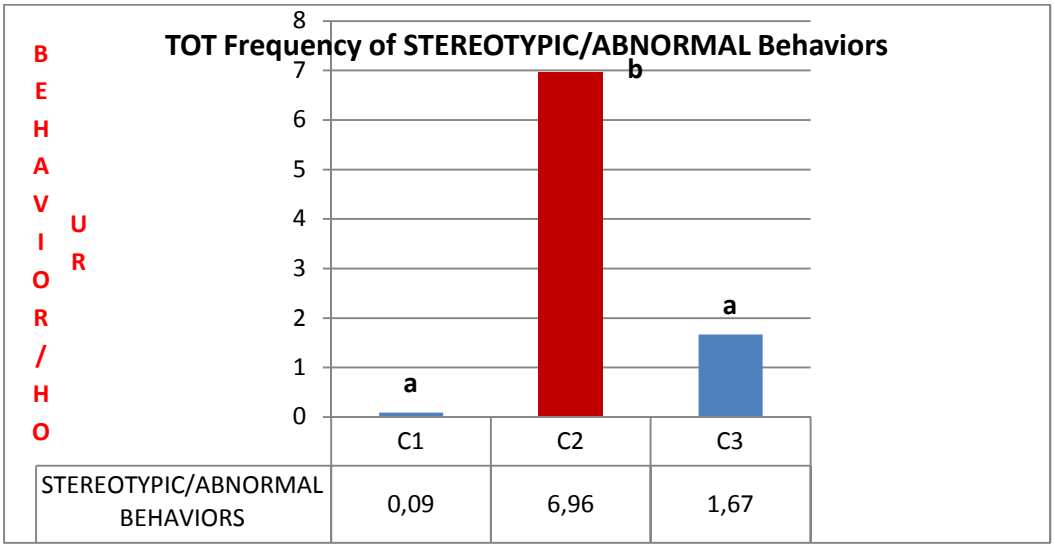


Fig. 7.12: *Average frequency of stereotypes and abnormal behaviors*

Sticky behaviors:

None social behaviors were apparently allowed to C3 horses (as seen when have been described their management/husbandry).

Total observed sticky behaviors were significantly higher in C1 (1,36 ±1,19) than C2 (0,22 ±0,48) ($P<0,05$). Reference values (concerning the same kind of behaviors that we considered to define this category) was 1,8 (Kiley-Worthington, 2009).

Within C1 behaviors aimed to social cohesion were higher during pre-meal than during rest; they were totally absent during pre-meal in C2 and they were really few during rest (Fig.7.11).

Split behaviors:

Total agonistic behaviors and dominance related hierarchies in C2 were significantly higher than C1 ($P<0,05$) (C1= 3,29 ±1,81; C2=7,39 ±4,11). These behaviors in C2 were around double than C1 during pre-meal (stimulus to competitive behaviors), remaining higher even at distance from pre meal situation, during rest observations (Fig.7.11)

The ratio tot sticky/tot split was 0,41 for C1 and 0,03 for C3. The reference value for the same behaviors that we included in split definition was 1,6, with a ratio sticky/split 1,12 (Kiley-Worthington, 2009).

Moreover among agonistic behaviors the ratio threats/aggressions was higher in C1 than in C2, both during pre-meal and rest (ratio of tot threats/aggressions C1= 8,15; C2= 0,78)

The same trend had the ratio sticky/split (pre-meal: C1=0,53; C2=0,08;
rest: C1= 0,41; C2=0,02).

Minutes standing:

Total time spent standing was significantly higher in C2 (48,53 ± 9,50) ($P<0,05$) compared to C3 (25,8 ± 8,69) and C1 (18,53 ± 11,89). The ratio tot. drowsy/ tot. not drowsy was 1,79 (C1); 0,19 (C2); 1 (C3), indicating opposite trend in the proportion of time spent drowsy within the tot standing among the centers. References values for the total standing went from 9,9 to 21,8, with ratio drowsy/not drowsy varying from 2,6 (wild) to 0,75 (domestic).

During pre-meal the time spent standing is sensibly higher in C2, compared to C1 and C3. During rest the trend respect pre-meal is similar within C1 and C3 (it tended to diminish, compared to pre-meal, even if in C3 it is still high), while it differed, remaining high, within C2.

Moreover among standing behaviors opposite proportions drowsy/not drowsy were detected, both during pre-meal (C1 =1,79; C2 =0,21; C3 =0,84) and rest (C1= 1,77; C2= 0,16; C3= 1,32)

Alert:

The total frequency of alerts was significantly higher within C3 (4,52 ± 2,62) compared to C1 (1,59 ± 0,77) and C2 (1,93 ± 1,28) ($P<0,05$). Moreover the variability of these attitudes among horses were lower within C1 and higher within the others centers.

Among the three centers horses displayed more alert while waiting for food (around double than rest values in C1 and C3, around the triple than rest values in C3), with the highest values assigned to C3 during both the situations.

Stereotypic/abnormal:

The comparison of domestic animals' behavioral repertoire with the feral should keep in count some physiological variability (due to individuals' variability and to domestic husbandry conditions, not necessarily affecting animal welfare). However the occurrence of stereotypic/abnormal behaviors in domestic animals is a clear symptom of difficulties in their adaptation to domestic environment. Concerning stereotypic/abnormal behaviors in C2 they were significantly higher, compared to C3 and C2 ($P<0,05$) (see fig.7.12).

Tot stereotypes/abnormal behaviors was nearly nothing within C1 (0,09 ± 0,23); within C3 the total average numbers of stereotypic/abnormal behaviors 1,67 ± 2,87; the highest total value was assigned to C2 6,96 ± 4,01.

The abnormal repetitive behaviors detected in C1 was head shake during pre-meal, none abnormal behaviors was detected during rest; in C3 only during pre-meal repetitive abnormal behaviors were observed (repetitive movement with head, pacing, lip nipping/stroking teeth on the metal post), with a high

variability among individuals. The observed behaviors might be included into the category of redirected behaviors.

In C2 stereotypes and abnormal behaviors were observed during both the circumstances (weaving; kicking door-box; wood chewing; repetitive licking) (9,58 ± 3,80 pre-meal; 4,35 ± 2,11 rest) and with less variability among individuals.

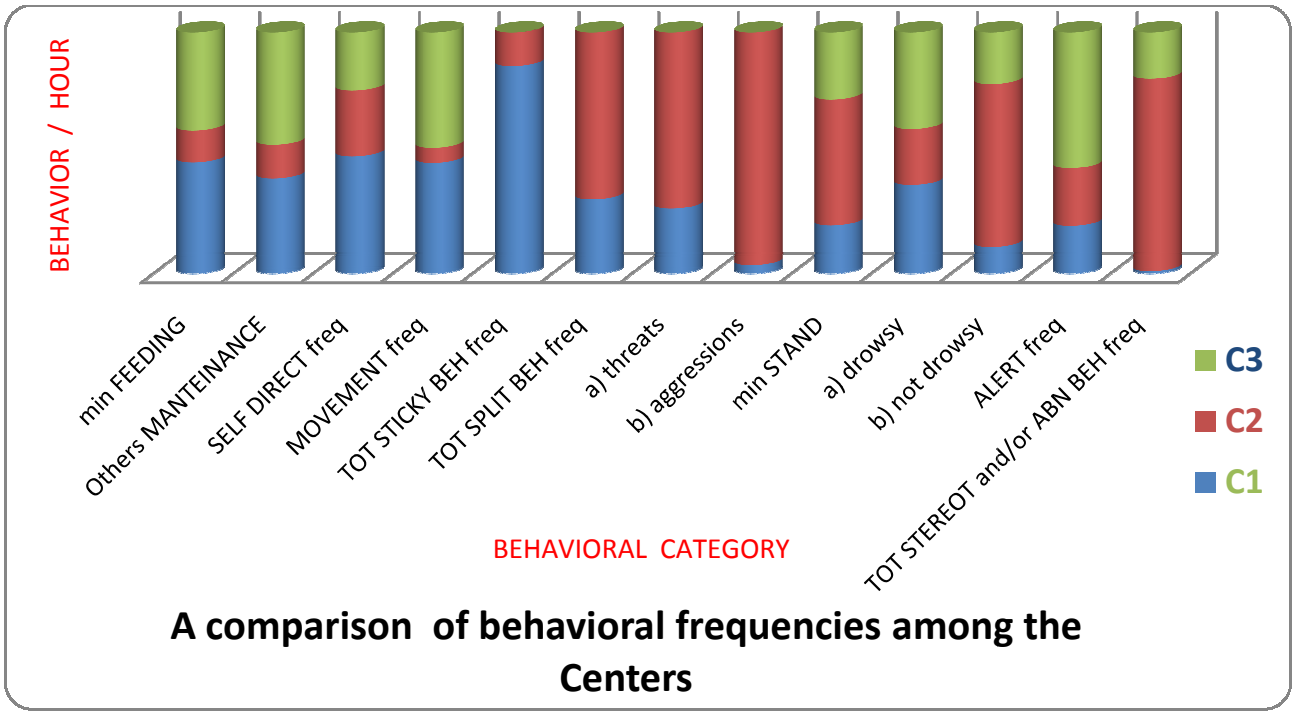


Fig.7.13: ***Comparison of the three centers with regard to the total (pre-meal+rest) average behaviors/hour performed. Numbers refer to the average frequency (minutes/hour) of the behaviors performed in each center; to each different color corresponds one different center.***

7.4. ETHOLOGICAL EVALUATIONS DURING THERAPEUTIC ACTIVITIES:

Ten individuals were further observed during their therapeutic jobs (C1 n=2; C2 n=5; C3 n=3).

In C2 among the 7 horses kept for TR we could observe during job only 5 of them, cause the others 2 were not used during the time period of our experimental observations. The reason referred from the responsible might per se constitute a first result, as it is that in the president's opinion those horses were not reliable during the last period, and therefore he decided to use them only within riding school activities (and only with the most expert riders).

The total focal sampling were 52; the total time of observations was 1237 min; the mean length of each job session was 24,2 ± 6,7 minutes.

The behaviors addressed belong to the following classes:

- social behaviors (*etero* and *omo* specifics);
- reactive behaviors;
- frustration and conflict;
- self directed;
- non compliant behaviors.

The **qualitative-quantitative** assessment of these behavioral categories did highlight, for some of the horses:

- increase in frustration/conflict or self directed behaviors;
- reactive anomalies;
- problems in the relationship with humans (aggressive behaviors, non compliant behaviors) or its strengthens (friendliness towards humans).

These findings, reported in the following tables (7.10 and 7.11) and in fig.7.14, might affect both the animal welfare and the efficacy of the therapeutic interventions (being a possible symptom/consequence of a lack of quality in the human-horse relationship).

		FRUSTRATION-CONFL	SELF DIRECTED	FRIENDLY HUMANS	HOSTILITY towards HUMANS	HOSTILITY towards HUMANS	THREAT EQUINE	AGGRESSIVE. EQUINE	NON COMPLIANT	ALERT	DROWSY
					handler	***child***					
C1	**MEAN**	**4,43**	**0,00**	**0,71**	**1,01**	**0,00**	**0,85**	**0,00**	**13,02**	**0,24**	**5,44**
	S.D.	*0,26*		*1,00*	*0,75*		*0,13*		*9,73*	*0,33*	*1,01*
C2	**MEAN**	**24,63**	**1,62**	**5,16**	**3,35**	**1,39**	**4,90**	**0,14**	**13,51**	**8,78**	**2,54**
	S.D.	*16,69*	*1,89*	*4,07*	*3,33*	*2,26*	*3,52*	*0,31*	*6,22*	*4,69*	*3,82*
C3	**MEAN**	**29,50**	**1,25**	**5,07**	**0,92**	**0,18**	**x**	**x**	**17,00**	**13,05**	**2,97**
	S.D.	*5,63*	*1,71*	*7,39*	*1,16*	*0,31*			*4,23*	*6,02*	*2,01*

Tab. **7.10**: *Average behaviors displayed by horses in each center during 1 hour of job* (total time of observation 1.237 min.; average session's length 24,2 ± 6,7 min.)

The data collected have been compared among the centers and to the previous observations done, to evaluate *if* and *how much* the general trend observed out of job corresponded in the two situations.

During job sessions the **general reactivity** of horses did vary considerably between C3 and the others centers (P<0,05). In C3 the **alert** frequency was 13,05 (± 6,02), in C2 it was 8,78 (± 4,69), in C3 it was 0,24. These findings agree with the observations previously made, concerning the different reactivity of horses.

		FRUSTR-CONFLICT	SELF DIRECTED	FRIENDLY HUM	HOSTIL HUM handler	HOSTIL HUM child	THREAT EQU	AGGR. EQU	NON COMPL	ALERT	DROWSY
	HORSE										
C1	***1***	4,62	0,00	0,00	1,54	0,00	0,76	0,00	19,90	0,00	6,15
	2	4,25	0,00	1,42	0,47	0,00	0,94	0,00	6,14	0,47	4,72
C2	***3***	35,61	0,70	1,05	8,77	1,75	9,12	0,70	5,26	1,75	0,00
	4	12,45	0,00	10,94	0,00	0,00	0,75	0,00	12,45	7,92	4,15
	5	31,65	4,56	1,52	1,52	0,00	1,90	0,00	10,63	14,43	0,00
	6	11,02	2,45	5,51	3,67	0,00	5,51	0,00	20,82	8,57	8,57
	7	32,40	0,40	6,80	2,80	5,20	7,20	0,00	18,40	11,20	0,00
C3	***8***	26,11	0,56	0,56	2,22	0,00	X	X	16,11	20,00	3,33
	9	26,38	0,00	1,06	0,53	0,53	X	X	13,27	9,56	4,78
	10	36,00	3,20	13,60	0,00	0,00	X	X	21,60	9,60	0,80

Tab. 7.11: *Average behaviors displayed by individual horses during 1 hour of job* (total time of observation 1237 min. ; average session's length 24,2 ± 6,7 min.)

The frequency of alert during job in C3 was the triple and in C2 the quadruple than the frequency recorded out of job context; moreover in C2 4 sudden flights were recorded (qualitative aspect of alert behavior that in this context assume relevant importance).

On the contrary in C1 horses shown less alert during job, compared to the pre-meal/rest observations.
Even if the other behavioral categories were not statistically significant we believe that this might be attributable to the low number of data (low number of subjects and hours of observations). Anyway we think that the data collected and above all the difference among the centers merit to be reported and discussed.

The **drowsy** attitude was the highest within C1, while within the others it was similar.
Social tendency towards **dispersive** behaviors was confirmed among C2 subjects, both towards humans and towards other horses. In fact hostility towards humans in C2 have been 3,35 ± 3,33 (towards handler) and 1,39 ± 2,26 (towards child); towards horses 4,90 ± 3,52 threats and 0,14 ± 0,31 aggressions (2 aggressions with attempt to bite the other horse) have been recorded. Noteworthy, as concern qualitative aspects of aggressive behaviors, 1 bite directed to the handler should be signaled and 2 attacks directed to other horses.
In C3 a lower level of aggressions towards humans was signaled: 0,92 ± 1,16 (towards the handler) and 0,18 ± 0,31 (towards child). It was not reported any aggressive behaviors towards other equines, since the job sessions were individuals (only one horse was into the riding school).
In C1 a lower frequency of threats towards other horses was recorded (0,85 ± 0,13), and none aggression. Towards humans no aggressive behaviors were recorded towards children and 1,01 ± 0,75 towards the handler.
Opposite trend had the **friendly attitude** towards humans: the highest frequency value was recorded in C2 followed by C3, while really lower value were recorded in C1.

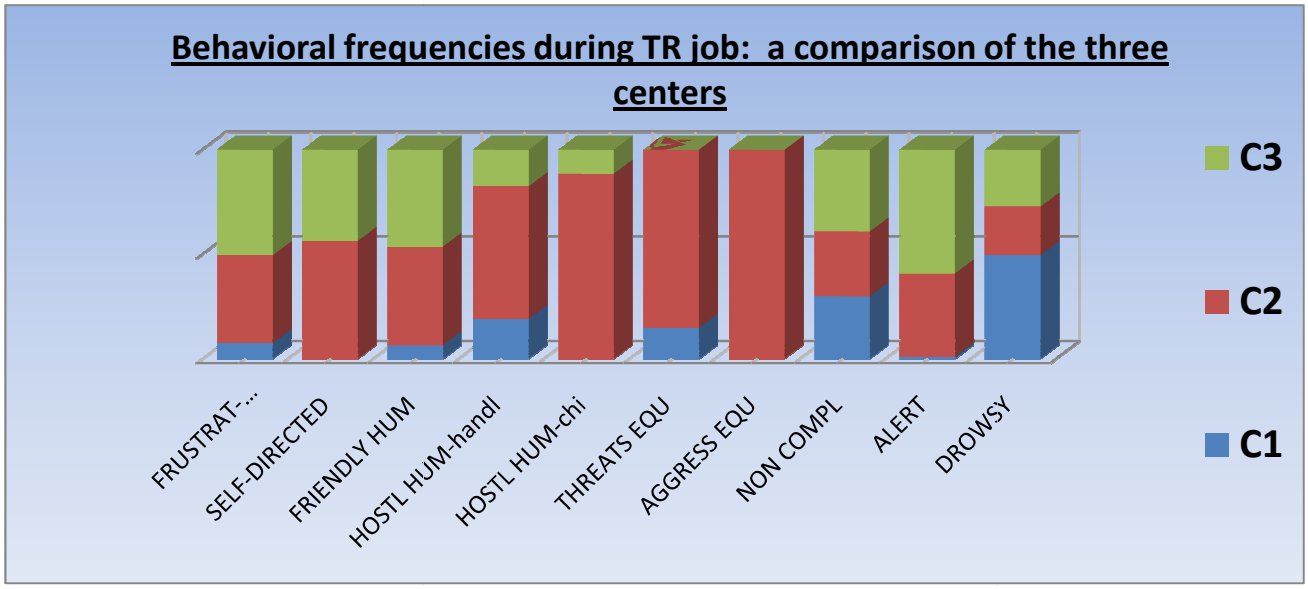


Fig. 7.14: ***A comparison of the three centers with regard to the average behaviors/hour performed during job sessions***

Frustration-conflict behaviors had similar frequencies within C2 and C3, while their frequency was lower in C1:

C3=29,50 (±5,63); C2=24,63 (±16,69); C1=4,43(±0,26).

The most represented behavior of this category was Chewing bite/Teeth grinding/Lip nipping (average behavior/hour 13,7); followed by tail swish and head shake/head toss (average behavior/hour for both 10,8).

Self directed behaviors were highest within C2=1,62 (±1,89), followed by C3=1,25 (±1,71); they were absent in C1 (even if during rest observation they had the highest value);

Non-compliant behaviors were quite similar in C1 (13,02 ± 9,73) and C2 (13,51 ± 6,22), while they were slightly higher in C3 (17 ± 4,23).

The two highest categories recorded have been refusing stand and push/pull the handler (average behavior/hour 11,7 and 11), followed by unrequested stop (average behavior/hour 8,2), head lowering (average behavior/hour 5,8) and nibbling/nipping with lips (average behavior/hour 5,5).

7.5. PHYSIOLOGICAL PARAMETERS (HRV; HR;):

Heart rate (HR) and heart rate variability (HRV) were used to study the physiological responses to the job and the adaptation of horses to their job.

The heart variables measured were the mean heart frequency (HR, bpm) and the root mean square of successive R-R interval differences (rMSSD, msec) to measure of heart rate variability.

HRV describes variations of both instantaneous heart rate and inter-beat intervals (IBI) (Task Force of the ESC and the NASPE, 1996) and gives information about the sympathetic–parasympathetic autonomic balance.

The rMSSD estimates the influence of the parasympathetic nervous system on heart rate variability.

Individuals with a higher parasympathetic activity would be more exploratory and adaptive to environmental demands.

A preliminary visual analysis of data was carried out in order to identify artifacts caused by movements of electrodes on the skin or muscle contraction, that were manually removed. For each horse, recordings without artifacts were selected.

Per each horse the average effect of job on both variables was calculated respect their basal values (as average job values – average basal values). (tab. 7.12).

First of all a general evaluation of the whole group (n=10) was conducted:

t Test was used to compare basal mean frequencies (HRbas) and variability (RMSSDbas) of the whole group to its correspondent values during job (comparison HRbas/HRhob and RMSSDbas/RMSSDjob).

No significant difference was detected in the group's HRbas compared to the group's HRjob ($P>0,05$).

Significant difference was detected comparing basal variability (RMSSDbas) of the whole group to its job variability (RMSSDjob) ($P<0,05$).

To have a comparative evaluation of the individuals ANOVA and Duncan-*post hoc* test were conducted in the comparison of both the variables.

It did not detect any difference as concern their basal HR value ($P>0,05$), while in their job HR significant difference from the other horses were detected

for horse4 and horses9, having had horse 4 the lowest mean value, horse 9 the highest mean value(P< 0,05) (fig. 7.15)

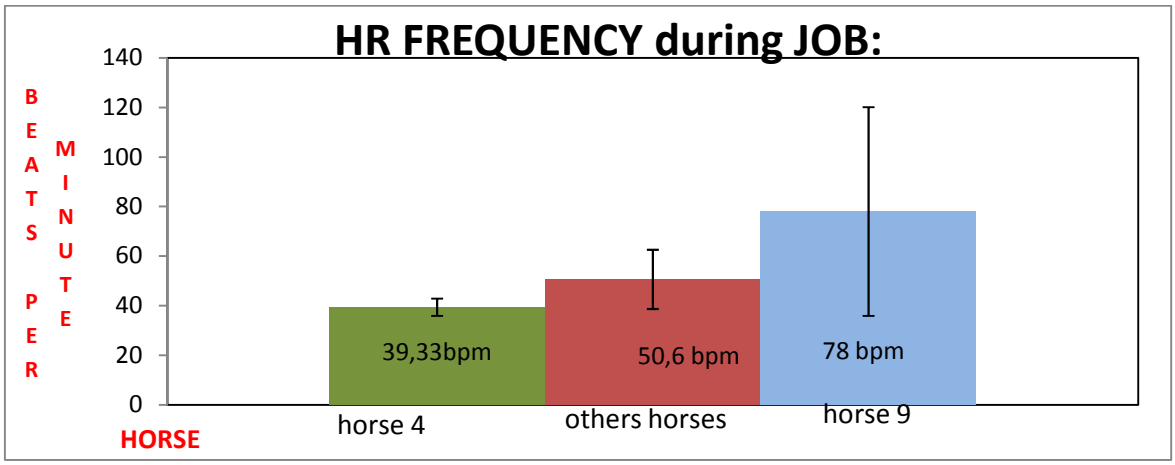


Fig. 7.15: *Significant differences among individuals' HR*

The comparison of individuals in their basal HRV did not detect any statistical difference(P>0,05); while their job HRV values did significant differ (having been horse 4 and horse 9 respectively the highest and the lowest value) (P< 0,05) (fig. 7.16).

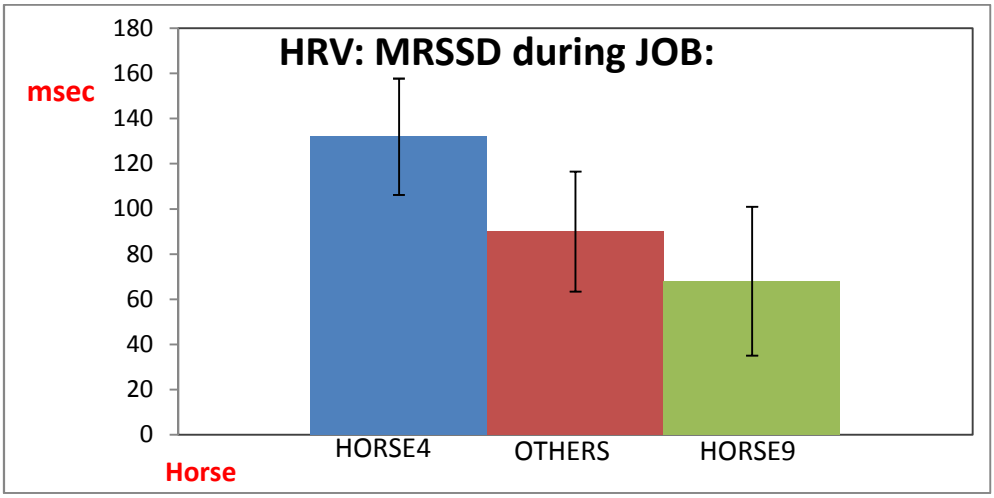


Fig. 7.16: *Significant differences among individuals' HRV*

Therefore to evaluate the response of each individual to TR job, t-Test was used to compare each individual's values to its correspondent job values (fig. 7.17):

t-Test was repeated for each individual, comparing both the HR basal-value to the HR job-value, and the HRV basal-value to the HRV job-value.

Basal HR frequencies (HRbas) were significant different from job values (HRjob) only in horse1 (P< 0,05) and horse 3 (P< 0,05).

Basal HRV (RMSSDbas) was significant different than job values (RMSSDjob) for all the horses (P< 0,05) except horse 6 (P>0,05) and horse 7 (P>0,05) (fig. 7.17).

		BASAL HR	JOB HR	BASAL RMSSD	JOB RMSSD	HR job EFFECT	RMSSD job EFFECT
	Horse1		61				25,43
		69		56,8	82,23	-8	*Positive*
	SD	*25,45*	*26,91*	*27,71*	*44,46*		
	Horse2	41,33	43,33	126,23	86,53	2	-39,7
C1	*SD*	*3,785*	*2,08*	*83,89*	*23,82*		
	Horse3	39,66	56,25	160,96	94,30	16,59	-66,66
	SD	*7,23*	*8,66*	*20,88*	*20,44*		
	Horse4						10,99
		29,33	39,33	118,73	132,72	10	*Positive*
	SD	*0,57*	*3,50*	*82,04*	*25,76*		
	Horse5	32,67	47,67	148,13	97,57	15	-52,56
	SD	*0,577*	*8,74*	*28,35*	*20,50*		
	Horse6						-35,25
		36,33	41,20	136,03	100,78	4,87	*no statistic different*
	SD	*3,51*	*5,07*	*39,84*	*4,61*		
	Horse7						-31,61
		42,67	47,00	101,33	69,72	4,33	*no statistic different*
C2	*SD*	*3,21*	*3,87*	*72,45*	*18,32*		
	Horse8	37	52,50	141,45	82,7	15,5	-58,8
	SD	*7,07*	*1,73*	*12,94*	*22,79*		
	Horse9	34,33	78,00	179,73	68,60	43,67	-111,13
	SD	*2,08*	*42,10*	*87,83*	*32,93*		
	Horse10	49,66	54,80	144,93	71,22	5,14	-73,71
C3	*SD*	*10,14*	*10,38*	*31,33*	*39,91*		

Tab. 7.12: ***Basal and job heart rate variables.*** *Marked the statistically values that differ from the rest of the group (blue the lowest value and green the highest values).Yellow marked the statistically significant job-effect values on HR and on HRV (red type negative effect; black type the positive effect)*

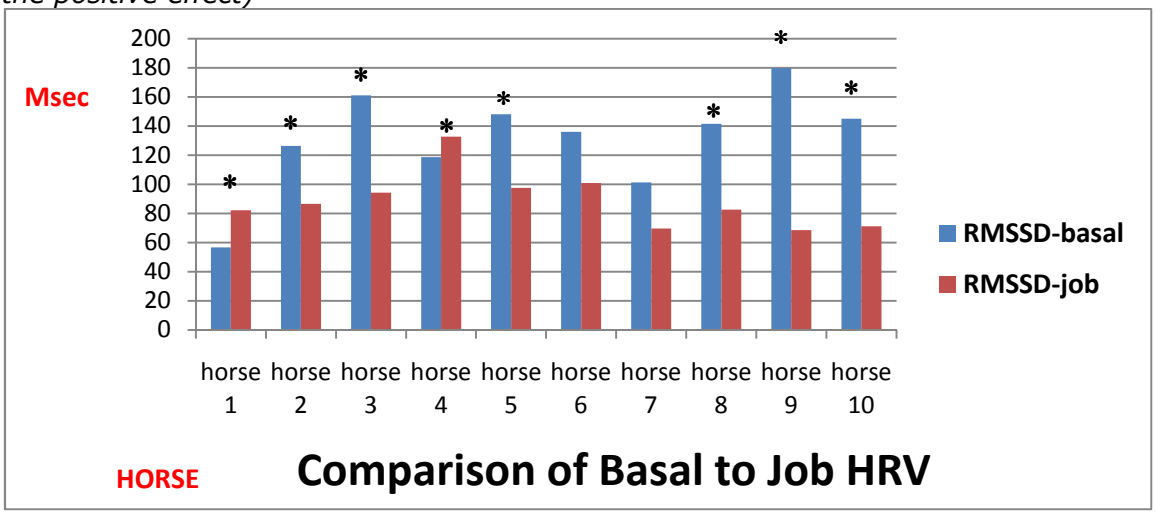


Fig. 7.17: *Comparison of the individuals' effect of job on HRV*

7.6. HANDLING TASK:

Of the different items the minimum and maximum possible scores for each score were:

- ✓ From 0 to 15 for the first item;

The middle item was composed by three under-level:

- ✓ From -3 to 9;
- ✓ From -9 to 3;
- ✓ From -6 to 6.

The latter 2 items had possible scores varying

- ✓ From 0 to 10
- ✓ From 0 to 5.

Therefore **the total score for the whole task** could vary from a **Minimum negative score (-18)** to a **Maximum positive (+48) .**

As reported in Tab. 7.13. The technicians did differ in the task: their score went from -5 to 43.

The highest average score was attributed to C2 (26,6 ± 11,5); the lowest to C3 (11,8 ± 10,7). C1 had intermediate score (20 ± 9,8)

As concern the average score of each item in all the three centers the most proximal to the minimum was the item *gesture*, followed by the item *voice.*

Within each center a great difference was detected between the two tested technicians.

In C1 the first technician had a general score that was double than the second, except for the item *body language*: in fact the first technicians had generally high postural tonus and less degree of use of body to communicate (even if he was completely relaxed, and not stiff). The second technician had lower scores concerning the item gestures, since he performed some ineffective and confusing use of hands (inappropriate caress) and did often pull the leading reins

Tab. 7.13: *Scores reported by each technician in the handling task*

	1) To Obtain Horse Attent And Inter Min 0/ Max 15	2) Concistency Clarity And Simplicity In The Use Of Stimuli			3) EXTRA SCORES		TOT		
		2.1 Min -3/ Max 9	2.2 Min -9/ Max 3	2.3 Min -6/ Max 6	3.1 Min 0/ Max 10	3.2 Min 0/ Max 5		Aver	S D
		BODY LANG.	*GESTURE*	*VOICE*	*ACHIEV. TASKS*	*INNOVATION*			
	C1								
TECHN 1	9	4	-2	3	8	5	27		
TECHN 2	5	8	-7	-1	5	3	13		
aver	**7**	**6**	**-4,5**	**1**	**6,5**	**4**			
st dev	**2,83**	**2,83**	**3,53**	**2,82**	**2,12**	**1,41**		**20**	**9,8**
	C2								
TECHN 1	12	8	-5	2	10	4	31		
TECHN 2	15	9	3	3	8	5	43		
TECHN 3	7	8	-3	2	8	5	27		
TECHN 4	7	6	-2	0	6	2	19		
TECHN 5	13	3	-7	-2	5	1	13		
aver	**9,8**	**7,8**	**-3,2**	**0,6**	**7,4**	**4,2**			
st dev	**3,11**	**4,02**	**3,42**	**1,94**	**1,94**	**3,11**		**26,6**	**11,5**
	C3								
TECHN 1	11	3	-3	1	7	1	21		
TECHN 2	12	-4	-9	-3	6	1	3		
TECHN 3	5	-3	-9	-3	5	1	-4		
TECHN 4	6	3	-1	4	8	3	23		
TECHN 5	7	2	1	-2	5	0	13		
TECHN 6	8	7	-5	-4	9	5	20		
TECHN 7	4	6	-8	-3	5	0	4		
aver	**7,57**	**2**	**-4,85**	**-1,42**	**6,42**	**1,57**			
st dev	**2,99**	**4,163**	**4,29**	**2,87**	**1,61**	**1,81**		**11,8**	**10,7**
TOTaver	7,70	4,75	-3,31	0,07	6,27	2,92			
TOTst dev	3,19	4,16	4,08	2,47	2,15	2,28			

In C2 we could observe more technicians, and a general best handling: in fact particularly two technicians performed the best task, and one of them received the highest score in absolute.

The first technicians did demonstrate generally good skills in the use of body language (particularly lack of stiffness, avoiding staring, use of his own position a stimulus) but a poor use of gestures (particularly for the abuse or wrong use of hand positive reinforcement).

Noteworthy the second technicians has had particular difficulties with one of the step (walking on the carpet), cause the horse assigned for the test was recognized as phobic. Phobia is an abnormal and un-proportioned fear, with abnormal (for their intensity and contingency) behavioral responses; it is joint to abnormal emotional reactions and neural-vegetative responses, such as tachycardia, tachypnea, shivering, fecal incontinence, sweating; it differs from fear for a lack of proportions between stimulus' and response' intensity and for being fixed and long lasting that do not decrease in absence of exposition to the stimulus (Boureau, 2002, 2003, 2004).

This phobia could be evaluated as a first type (rational) phobia (Boureau, 2002, 2003, 2004), showing a simple scheme *stimulus-response* (without any manifestation of any anticipatory emotional response as consequence of a complex/associative learning with association of the phobic object to anticipatory stimuli).

Noteworthy its handler received the highest score, having reacted to the evident emotional state of the horses by trying to calm through postural/verbal language. The handler did use mainly positive secondary reinforcement (voice), he did not use any punishment, and few negative reinforcement (trying do not pull on the leading rein) and never using body or verbal language as negative reinforcement.

Even if he tried new strategies (his score concerning the item innovation was the maximum) he did reach only partial results (score of item goal achievement 8) and the minimum distance of the horses was one meter from the carpet.

The lacks shown by this technician were the under-use of the voice and a general under-use of possible reinforcements (particularly the positive ones in this case), while he did performed really well in the use of body language and the use of gestures (maximum scores), demonstrating complete awareness of the stimuli they represent to the horse and also a good self-awareness.
The lowest scores belong to technician 5, particularly for the scarce use of the voice, the poor or misuse of body language and gestures (staring the horses to ask him to follow, being stiff, do not being aware of own his own position and of its meaning to the horse, using inappropriateness the hands through pulling the leading rein and caressing without real or meaning or appropriateness to the context), the scarce attention to the horse, and therefore the incapacity of predicting/observing the horse responses and on this basis varying its own behavior (removal, addiction, variation of the stimuli).
A good example of this was observed during grooming, where the technician had to ask the horse to lift its foot: the technician do not use appropriately any of the possible stimuli (really "passive" body position and use of body, body stiffness, ineffective and inappropriate use of voice); moreover he responded to the undesired behavior of the horse (that did not lift its foot) with contradictory stimuli, that did positively reinforce the horse do not lifting the foot, and instead lifting to push with its shoulder on the technicians' back.
Among all the technicians (except the technician 2) a low scores were attributed to the sub-items tightness of leading rein: in fact they did hold the leading rein so short that the horse couldn't neither move the head, as natural balancer at walk, nor move the head to visually explore the object positioned along the track.
The third center had the lowest average score and the highest standard deviation. Of the different items the lowest score, compared to the others centers, was attributed to the use of voice: in fact the technicians did generally not use the voice at all, some of them did use the voice in a inconsistent way, with inconsistent intonation or continuously talking "just to talk" to the horse, moreover two of them did spend more than 50% of the task talking to other people and without paying any attention to the horse.

Another item were these technicians did perform generally worst than those of the others center was the innovation. The low score is mainly related to the lack of attention paid to the horse: in fact 3 of them did walk in front of the horse, without paying attention to him, and therefore pulling the leading reins whenever the horse did change its gait and using with a less extent the postural communication (and this did affect also the score of item 2.2 *gestures*). Moreover concerning the item *gestures* 4 technicians did receive low scores for their ineffective use of hands (caressing and continuously touching the horse, without intentional meaning or inconsistently with horse's performance).

Noteworthy the highest score (among this center) was attributed to technician5, that received also the highest score in the item body language. This technician represent a particular case cause he have some physical and emotional problems (he is an assistant of others' technicians, and he started working as "occupational therapy"; when he was rehabilitated he start working as assistant). This technicians did demonstrated an inappropriate use of voice and of gestures (due to a lack of skills, but also to his physical and emotional problems), anyway this technicians performed better concerning the items innovation and goal achievement for the great attention to the horse, and the capability to predict the horse and modify his own behavior as result of this prevision or of the most attentive observation of the horse.

A general positive aspect within the main part of technicians (5) of the center, compared to the others centers, was the higher scores in the use of the leading rein (less tightness and pulling on it), even if they had low scores as concern the use of body position.

7.7. THE SCHOOLS-PROJECT:

The children involved in the project were 462, with at least 1 disable child for each 19 classes (the consistency of the class was 24 ± 5 children per teacher). More than one teacher for each class was involved in some case (even if not contemporaneously, but in different phases of the activities eg only in class or only at the riding centre). The total amount of questionnaires collected was 48

(24 PreAQ plus 24 PostAQ). For this reason we report the results either as percentage of the teachers or as percentage of the amount of classes they concerned to.

PRE-AQ:

75% of the teachers own(ed) some pet, and appreciate the important role of animals in our society; 41% has already been involved in some animal assisted project, but their judgment on its possible benefits regarding social and behavioral dynamics has been negative for 70% of them.

Teacher's expectations has been in the majority related to educational goals (social-behavioral or affective-emotional education), more in detail they were related specifically to the scholastic inclusion of disabled child for 83%, whereas for the remaining 17% of teachers they were concerned with possible didactic or disciplinary objectives (particularly in scientific, literary-graphic-corporeal expressive area), by means of the great motivation of children regarding animals.

Scholastic inclusion of disabled child has been judged to be problematical for 78% of the classes. For 83% of the classes child has referred his equestrian experience during scholastic activities, on condition that he was previously explicitly demanded by teachers or tutors. Finally for 79% of the classes teachers reported the presence of others children affected by some social-behavioral or affective-emotional problematic (although certified cases were only 2).

POST-A Q:

With regard to relational modifications among children (during the activities at school or at the riding school centre) it has been judged to be positive for the 85% of the classes (improvement of level and degree of involvement and evidence of new relational dynamics during activities purposed).

For 50% of the classes, teachers referred longest-term effects concerning the improvement of relational dynamics among children.

The project has been judged to be up or over initial expectations for 100% of the teachers and only one of them expressed the uselessness of a possible future activities' continuation (having already been reached all the objectives).

Instead remaining teachers would repeat the project, to enhance its preliminary results.

In relation to possible suggestions for a new edition of this project they have regarded its duration (judged to be too short) and the request of a greatest teachers' involvement, through specific planning meeting before and after activities.

The FINAL REPORT filled by TR staff highlighted an increase of social, behavioral, affective, emotional abilities in the child they have followed during the year. More in detail TR instructors referred the enhancement of pro-social behaviors between children (rules- respect, cooperation abilities, attention to others) and a general emotional and affective maturation.

The SOCIO-METRIC TEST confirmed teachers' and TR instructors' judgments, concerning the positive modifications of social dynamics among children. Interesting considerations should be done concerning: the relationship between children; the different roles and dynamics inside the class; the perception and feelings of children about this experience; and finally the single children's emotional experienced arisen by means of carried out activities.

In fact items administered to children in the test highlight a generally positive emotional worthiness, characterizing child's perception towards his own experience. Children's answers to Items highlight the general tendency to a positive pole (along an imaginary continuum, from very positive to very negative judgments towards their class-mates). Despite request has been expressed very clearly to prevent possible misunderstanding, nevertheless in pictures drawn after activities 30% of children could report only the favorites class-mates, and did not report rejected once. Even if this date could be explained differently, in our opinion the most plausible interpretation refers to children's emotional experienced during activities. We believe that the experienced has been so much positive to shift children's judgment to the extreme positive front (making difficult to children to report negative judgments about their class-mates). It seems that, even if predilections have emerged (according by children's custom) the powerful experienced activities with horses made more difficult to reject anyone.

With regard to the roles inside the class-group it seemed to not vary, having remained quite constant.

8. DISCUSSIONS OF THE RESULTS:

8.1. PRESIDENTS' QUESTIONNAIRES

Both the questionnaires (for the presidents and for the technicians) aimed to measure both subjective and objective parameters of equine welfare. In fact, to effectively investigate the outcomes of human-horse relationship within TR context, is required a comprehensive and "holistic" approach, including several levels of enquiry: psychological, sociological, economical, ethological, physiological.

The centers interviewed were quite variable as concerns their dimension, age, kind of activities performed, qualifications of their technicians; this variety seems be representative of the real situation existing in this field.

The lack of univocal characteristics of this job on one hand might be related to its own nature, on the other hand might reflect the not yet clear definition of possible methodologies and contents. Another notable aspect is the lack of accurate juridical rules at regard, and therefore the not yet defined specific qualification and training necessary to become a TR technician.

The lack of better defined and standardized parameters and methodologies seems to affect both the therapeutic-educational aspects and those related to the horses, particularly concerning their initial choice and, above all, their specific training, management and husbandry, constant periodical screening.

This lack may affect both the efficacy and the ethics of this animal-assisted activity.

It seems that the number of technicians working within the centers was not always related to the number of users attending the centers, neither to the number of days of activities: in fact ratio "users/technicians" was quite variable: 11,6 ± 9,5 (with the highest ratio belonging to the French and the Swiss Center: 33,3 and 15), even in those centers opened for the same amount of days. This ratio might reflect the fact that, in our Country, this job is often performed by technicians that at the same time do perform several different jobs (therefore in each center would need more technicians, each

been working less time). On the contrary in the two foreign centers their technicians performed the TR job as their first job.

The great variability of the ratio "user/horse" among and within the centers may be related to the existence of some difficulties in the involvement of the horses, which seems to be dealt by the technicians through:

a. leaving the animals resting;
b. concentrating the greatest amount of job on the most reliable horses.

These reflections are confirmed also by the questionnaires administered to the technicians working in the centers.

Noteworthy **in the center where the horses did work more (highest ratio users/horses) the average work-longevity** of the horses **was highest too** (highest longevity index and highest average individual job longevity).

Whilst, where the longevity index was the lowest, the ratio "users/horse" was the lowest as well. This data may confirm the previous reflection: the less is the amount of job per horse, the more is the in-aptitude of horses and the more is the turnover of animals in the center. Therefore it seems that the strategy consisting in leaving the animals resting is not efficient, to warrant horses' work-longevity. This data might be related to several factors: one of them may be referred to the initial condition of the animals involved (both physical and behavioral); the others to the type of stress acting towards these horses (boredom, constriction, lack in the adequacy of physical and social stimuli). Towards this kind of stress the simple reduction in the amount of job may not only be inefficacy, but it may also have opposite effects (see tab.7.1).

A confirm in this sense seems to come from the presidents' answer concerning the most common reasons of rejection of the horses, identified by **62% of the answers with behavioral problems** "stress; oldness; apathy; abnormal reactivity; fear; aggressions to people". Moreover the same direction is hold by **87,7%** of the answers reporting negative beliefs, concerning possible psychological outcomes arising from this job and horses' welfare (defined as **boredom, stress, stereotypic behaviors; diminishing of social attitude towards people; increase aggressive behaviors toward horses or people**).

Noteworthy in the center (C5) with the highest longevity (and the highest amount of job per horse) it was established the **figure of a "responsible of the horses", and specific and structured actions** have been **planned** in this sense (specific constant periodical training sessions; constant and structured individuals' screening to access their welfare). Furthermore the horses kept in this center did work only with TR and this may prove that the impact of therapeutic job towards horses' welfare might not be necessary negative, if **prophylactic measures** are settled.

Noteworthy, among those centers where horses *do not* live always out, respectively the highest and the lowest longevity index is assigned to those centers that declared longer time spent in paddock by their horses (these centers are also the most experienced ones, having been working since more than 15 years); however it must be noticed that while in the high-longevity center the horses are kept in group in big yards, in the lowest one they are kept in individual small paddocks (tab.8.1).

AVERAGE hours/week SPENT OUT	CENTER	SPRING	SUMMER	AUTUMN	WINTER	TOT Weekly AVERAGE and type of grouping
	C1	ALWAYS (group yards/pasture)				ALWAYS (group)
	C2	30	40	30	20	30h (individ)
	C3	ALWAYS (individual paddocks)				ALWAYS (individ)
	C4	8	8	8	0	6h (indiv/group)
	C5	40	ALWAYS	40	40	72h (group)
	C6	NEVER				NEVER
	C7	10	16	10	0	9h (N.R.)
	C8	30	72	30	If poss	28h(group)

Tab. 8.1: *Average number of hours/week spent out (paddock/bigger yard/pasture) during the different seasons of the year and relative type of grouping). Respectively Grey and Yellow marked two couples of centers, where horses are kept always or for the longest time out. In each couple one center keep the horses in group while the other keep the horses in individual paddock/yard.*

This might confirm scientific findings concerning the importance and complexity of equine social life, and the negative effect of **social deprivation**.

The same trend seem to be shown between the two centers that keep their horses always out (being kept in one center in group and in the other in individual paddock).

Possible negative **physical-effects** of TR activities on the horses were denied by 62% of the presidents, having declared that this activity doesn't have, in their opinion, any negative physical consequence; while the others 38% declared that in their experience this job may have negative physical consequences (such as back pain due to heavy or unbalanced riders, whenever not correctly ridden by others riders). As previously seen more agreement was expressed concerning possible negative behavioral consequences to the horses (88% affirmative answers in this sense). The only negative answer is explained with the affirmation that "*if correctly managed this job doesn't have any negative consequences to the horses*". Noteworthy in the same center the president did declare that, in his experience, the main causes of rejection of the horses from the TR job were "*fears and physical disabilities"*; moreover the same center had the shortest average work longevity and the lowest "longevity-index". Furthermore the same center denounced the earliest rejection (earlier than one year), due to behavioral problems (sudden flights and escape; to buck; to kick others horses).

As concerns the technicians' education related to horses, 5 of the centers had a **common basic education** provided to their technicians (through riding national federations, university courses or internal courses and up-to-dates); however all the presidents declared that would be interested in countrywide qualifications for TR technicians.

As concerns the social recognition of this job, the data collected seems to reflect the lack of social, and maybe economical, safety and certainties. This data seems to be confirmed by the high number of technicians performing several different jobs contemporary with the TR ones; this is shown also by the higher (compared with the foreign centers) number of TR technicians per Center, working each for shorter time periods.

8.2. TECHNICIANS' QUESTIONNAIRES

The items evaluated do reveal a **general technicians' good attitude and interest** towards horse (definitions of the horse as "*excellent therapeutic tool, provided that has been well trained to obey to the orders*"; "*perfect relationship mediator*"; "*excellent partner for human beings per sè for his behavioral and physical characteristics*"; or the fore seen declaration of interest towards horse and possible relational improvement). However the mentioned declarations may also hide a **lack of clarity** concerning the importance of animal's aptitudes and dispositions (leading to the animal's inclusion/exclusion from therapeutic activities) and concerning the knowledge of the indications, counter-indications and mechanisms of action of therapeutic horse-assisted activities.

Moreover preliminary results may reveal some **inconsistency and contradictory aspect in the perception of TR technicians concerning the animal welfare**; or may hide, at least, an under-evaluation of the importance of the whole aspects that may determine it. In fact the technicians on one hand declared that they don't believe that this job might be useful or acceptable to the horses, but on the other hand they do not think that this fact could affect the animal welfare/good attitude towards job (since they declared that horses are generally "*contented*"; "*safe and reliable*" and their general management husbandry is "*adequate to their need*").

Some symptoms of problems within human-horse relationship have been referred by the technicians. **Problematic horses' behaviors** in fact have been reported by them, that were judged as interfering with TR activities, and therefore probably have also affected their relationship with horses.

Each behavior reported, even if includes several level of explanations, may be **coupled with some specific characteristic of the therapeutic job** and can be considered both as cause and consequence of relational problems.

Aggressive behaviors might be considered the most specific symptom of relational problems, and the most distant from the aims of the TR activities. They may be related to *technicians' deficiencies in the knowledge/application*

of the learning and communication theories, or to *deficiencies in the management* of the animals; another level of explanation may refer to some *deficiency in the choice of the animals* to be included in the therapeutic job.
Further different behaviors that could reveal some relational critical aspects were reported from the technicians with higher percentage: repeated stop; refusal to stand, lack of respect of physical individual space of people (pull, push *etc.*) and undesired behaviors while getting on.
These behaviors may be explained in several ways, included a *lack of consideration of the social or emotional positive aptitudes* when the horses have been chosen, and possible *deficiency in the initial and in the periodical training/education* of the animals. Anyway the most interesting aspect, that could be related, at least to some of them, is the repetitiveness and the *lack/inadequacy of stimuli (physical, cognitive, social) of this job*; in fact one of the problems reported by the technicians is the acquisition of an hypo-reactive attitude by the animals (which are defined as "switched off") and the contemporary existence of hyper-reactive attitude (see further about the emotional balance of the animals). Some of them could assume a relevance in consideration of the relative frequency they are displayed and in consideration of the high relative length of their "trigger" situations. In fact, during each session (and many different ones could follow one another with no or really short breaks), the horse must perform several stops to let the child carry on several games/exercises; the horses must also wait for several minutes immobile while the disabled patients get on (which may require several well trained assistants acting around the horse, depending on the pathology of the patients).
Furthermore also the reported frustration conflict behaviors might reveal some un-consistent aspect of the human-horse relationship (inconsistence both with equine social behaviors and with the aims of therapeutic interventions, that should be based on a positive relationship).

Besides the horse's behaviors subjective and objective indexes of the quality of human-horse relationship were related to some technicians declarations about

their **perceptions/feelings** and about their **habits** (concerning their use of the horses):

- ✓ It seems that the technicians do feel in some way **guilty or not completely satisfied in regard to the type of relationship imposed by the activities** ("*I would like to have with the horses I use in my job a different sort of relationship, out of TR context*"). This data that could be related with the afore-said items, concerning technicians' beliefs concerning a lack of acceptability (to the horses) of the job demands and the deny of reciprocal life-enrichment. One more explanation for this data could be that this job may oblige the technicians to remain concentrated mainly on the human patient ("*the most important focus is the horse/ the most important focus is the human patient*")
- ✓ Another index of relational problems might be related to the **low time/ low quality of work on the ground with the horses**.

  In fact, if the riding constitute one important (and maybe the most appealing) part of the therapeutic activities, it is only *one* of the practical applications of the relationship with horses. Of course it is true only provided that the technician himself do have a positive relationship with the animals, and can therefore make available to the patients all the educational and therapeutic potentialities connected with the horse-patient relationship.

  Anyway, even if the main relative percentage of technicians privilege the riding activities, a relatively high percentage is aware of the potentialities of the relationship with horses on the ground. However connecting the previous items (about the other problematic relational aspects) with the relatively low time spent handling, one may speculate about the possible relation existing between time spent handling and critical relational aspect between the horses and the technicians.

  This aspect should be highlighted since it attains not only to the equines welfare, but also to the complete use of the beneficials arising from the relationship for human beings.

A confirm in this sense seem to be brought by the items where respectively 79,41% and 50% of the technicians declared "*to use for the handling only some",* of those horses available and "*to trust only one (or more) horse(s)"* (excluding the others if they can).

- ✓ This item besides revealing some problems existing in the human-horse relationship may also reveal a further aspect affecting equine welfare: the **over-use of some horses and the under-use of others horses** kept in the centers (a problem that is confirmed further by the following open answers).
- ✓ Noteworthy when inquired about the level of safety/rely of horses and about the mutual understanding with horses, the main part (respectively 88,23% and 76,47%) of the technicians gave positive judgments on these aspects; these answers seems to be in contrast with the previous, and may reveal some **contradictions** and **un-declared or misrecognized problem** in the relationship between horses and technicians.
- ✓ Also the data about the safety issues (**environmental/constraint tools versus relational once**) show some contradictory and inconsistent aspect, among the subjective perception of the technicians (as concerns their positive relation with horses) and some horse's and human's behaviors, that might be used as more objective parameters of some critical relational aspect (see fig. 7.7: "possible symptoms of relational difficulties".)
- ✓ The **evaluation of the education received** (in relation to the use of horses) is **generally positive**; anyway the totality of the operators declared to be **interested in improving their skills** and knowledge about horse (100%) and in improving their relationship with the horses (97,06%). Furthermore 50% denounce **lack of consistency of conduct** among the rest of the staff as concern the use of the horses. This declaration may reveal a possible deficiency related to the specific training of the technicians about the horse's involvement (in agreement

with the previous items); moreover this lack may constitute a sort of "break-point" within the group and its dynamics.

- ✓ As concerns the technicians emotional state the results should stimulate a consideration about the **strong emotional impact** of this peculiar job which, involving several contemporary relational exchanges (with the patient; with the horse; by the horse towards others equines around him; with possible assistants, with the rest of the staff) requires deep awareness, strong emotional balance and several transversal skills. The lack of these requirements in fact could lead to a diminution in the efficacy of the interventions and determine a possible burning-out of the TR technicians.

CONCLUSIONS

Of Presidents/Technicians-Questionnaires **:**

In conclusion the answers given (through both the questionnaires) seems reflect:

1) The **general good awareness** of the responsible of the centers, **concerning the possible negative impact of this activity to the horses**.
2) Some **contradictions in the following strategies adopted, and in their efficacy** (highlighted by the longevity indexes decrypted and by the declarations, concerning the most common causes of rejection and the effect of this job to the involved horses).
3) **A lack of analytical and structured broad of interventions aimed to the animal welfare** and to the empowerment of the potentialities arisen trough the relationship between humans and horses.
4) A general **high degree of** technicians' **interest** towards horse and possible way to improve their knowledge/skills.
5) The existence of **objective indexes of critical aspects,** concerning the relationship between horses and technicians:
    - horse behaviors defined as "problematic situations interfering with the job";

- low time spent handling;
- lack of homogeneity in the amount of job per every horse (due to the lack of confidence of the technicians towards some of them);
- high reliability assigned by the technicians to the physical control/ restraint of the horses as safety tool.

6) The existence of some **job-specific stressors** acting on the horses (demonstrated by some horse' behaviors) and the relative awareness of them, among the technicians. These might be related to:

- deficiencies in the knowledge/application of the learning and communication theories by the TR technicians;
- lacks in the management of the animals;
- lack or inadequacy of stimuli (physical, cognitive, social);
- deficiency in the initial training of the horses and in the consideration of the social or emotional positive aptitudes when the horses have been chosen;
- frustrating/conflicting/constrictive/ (physical and cognitive) stimuli related to TR job, causing physical pain or emotional un-balance of the horses.

7) The existence of a **subjective negative perception** about the general inadequacy of the relational type imposed by the TR activities and about the unacceptability of the demands **of this job to the horse.**

8) The general really **positive subjective perception** regard the effects of the human/horse relationship **for human beings.**

9) The existence of some **inconsistency aspects among** judgments given, concerning the impact of the activities on the horse, and the quality of the human-horse relationship. This inconsistence was: among the **negative perceptions** (previously reported)**/feelings** (that seems to lead to some conflicting emotion) and the expressed judgments (**positive judgments** about welfare and mutual understanding with horses); among these positive judgments and some **objective parameters** of relational deficiencies (above-mentioned).

10) The **high emotional demands** and **impact** (to TR technicians) of this job, especially in relation to the involvement of several contemporary levels of relationship.

11) The general **good perception** as concern the **staff dynamics**, the job satisfaction level, the training received.

12) A **lack of univocal beliefs, knowledge, procedures** afflicting the education of the TR technicians about the involvement of horses in TR activities.

Fig. 8.1: *Increased time standing not drowsy: a possible outcomes of hypo-stimulating environments (notice also the position of the horse, respect the window, that might indicate research of social isolation from humans)*

8.3. ETHOLOGICAL EVALUATIONS DURING PRE-MEAL AND REST

Large differences in the amount of time performing behavioral activities (time budget) in the comparison of domestic animals to their feral or wild co-specifics has been used as a measure of poor welfare.

Compared to their feral relatives, the diversity of behaviors observed in stabled horses has been dramatically altered, due to the confining nature of the husbandry system. Time budget analysis of feral and pasture-kept horses has

uncovered the importance of inter-specific social contact, exercise and lengthy grazing times.

However several studies did demonstrate that, when given *ad-libitum* hay and the opportunity to see and touch adjacent horses, the time budget of stabled horses is very similar to free-range horses in regard to time spent eating and resting.

The greatest variations among the centers and between some of them and the wild (see tab. 7.8.) were observed concerning:

1. Time spent feeding and other maintenance: they were significantly lower within C2 (P<0,05);
2. Minutes standing: C1 and C3 didn't significantly differ each other, while C2 was significantly lower; moreover the time spent not drowsy was significantly higher within C2,
3. Social behaviors, with opposite trends within C1 and C2 as concern cohesive and agonistic behaviors, whereas within C3 the horses hadn't any possibility to perform social behaviors.
4. Reactivity: alert frequency was significantly different higher within C3; while drowsy standing was significant lower within C2.

Total time spent feeding

This difference is attributable to the rest observations. In fact the total time spent feeding in the 24h time budget is related to the amount of forage fed and therefore to its availability within 24 hours (and on pasture availability, for C1).

A low time spent feeding is obviously recorded in all the three centers at the time periods preceding the meals, this data depends on the forage rationing, it was administered twice a day in the first center (C1), three times in C2 and C3. During rest observation (and therefore at least 1,5 hours distant from meal) the time spent feeding was:51,94 (C1); 12,37 (C2); 43,57 (C3).

The data seems reflect a lack of possibilities to perform normal feeding behaviors in C2.

Fig. 8.2: ***Lack of straw in the morning litter (one possible symptom of need for higher roughage availability)***

In this Center hay was rationed twice a day (morning and evening), whilst at midday pellet-hay was administered. In the morning and in the evening horses did finish their ration within 1 hour, while at midday they finished within half an hour. The straw of the litter was available only for a short amount of time (being horses kept in a bare paddock); in the morning (in fact horses spend the night inside) no straw remained on the bed (having been almost all eaten by the horses during the night) (see fig. 8,1).

Within C3 larger amount of hay was distributed three times per day, and horses often didn't finish their hay between one administration and the following.

In C1 hay was fed twice a day (at 8 am and 5.30 pm); during the day horses had access to pasture around for 1-1,5 hours/day. The hay ration was generally eaten within around 5 hours (and therefore around at 3 pm).

Moreover the difference in the amount of time spent feeding between C1 and C3 might also confirm previous research about the importance of social facilitation, concerning feeding behaviors in horses: despite the fact that in C3 horses had more food-availability the tot time spent feeding is anyway lower than C1 (in fact while in C1 horses were kept in group in C3 horses were kept in individual yards).

The **time spent standing** was sensibly lower within C1 and C3 ($P<0,05$), moreover the significant difference was statistically attributable to the tot time spent standing not drowsy, sensibly higher within this group ($P<0,05$): it seems therefore that horses within C2 spent more time standing, doing nothing (see fig.8.1). The lack of a stimulating environment and of the possibility to develop normal social relationship might be the cause of this behavior observed.

The environmental characteristics in fact differed sensibly among the centers, particularly in relation to the spatial availability.

The **number of alert** within C3 was significantly higher than the others two groups (P<0,05), it was intermediate in C2 and the lowest in C1.

It seems that where horses couldn't perform any social inter-specific behavior it was the highest, while where they had the possibility to perform social behaviors it was lower (even if no statistic correlation was found between the number of alerts and social behaviors).

The amount of **movement performed** was significantly lower within C2(P<0,05), and it was also sensibly lower than reference values in feral/pastured horses. This might confirm a lack of stimuli to those horses. Furthermore while within C1 and C2 the relative amount of movement seems to be in some way related with the alimentary frustrated motivation (having been increased during pre-meal observations), within C3 it was higher during rest than during pre-meal, and might therefore be related to different motivations (cognitive/physical needs).

Concerning social behaviors C3 was not sampled for their impossibility to perform the recorded behaviors. C1 and C2 were significantly different in relation to both the categories recorded (split and stick behaviors)(P<0,05).

Within C2 social behaviors did shift to the extreme "agonistic front", while within C1 there were less agonistic and more cohesive behaviors than C2, even if the amount of agonistic is still higher than reference value.

Fig 8.3: *Allogrooming between pairs in C2.*

Moreover among agonistic behaviors the ratio threats/aggressions was higher in C1 than in C2, both during pre-meal and during rest. The same trend had the ratio sticky/split.

Therefore in C1 horses perform less agonistic behaviors compared to C2 and among the agonistic behaviors they performed less aggressions than threats, while in C2 there are

much more aggressive than threatening behaviors.

Noteworthy in C1 under a frustrating situation (waiting for food), and particularly in the latter 10 min. of this (horses could see and hear the un-reachable food resource being prepared by the groom), instead increasing just agonistic behaviors horses tended to increase also the performance of self-directed behaviors and sticky behaviors (*allo*-grooming between pairs of favorites companions) (see fig. 8.3).

Moreover a statistical significant negative correlation was found between time spent feeding and split behaviors performed (Pearson rank: R=-0,543; P=0,001): the less is the time spent feeding the more were agonistic behaviors performed.

The last finding is probably the most important to animal welfare evaluation: in fact concerning **abnormal stereotypic behaviors** C2 significantly differ from C1 and C3 (P<0,05).

Tot stereotypes/abnormal behaviors was nearly nothing within C1; within C3 the total average numbers of stereotypic/abnormal behaviors was low, and the highest total value was assigned to C2.

In C3 only during pre-meal repetitive abnormal behaviors were observed (repetitive movement with head, pacing, lip nipping/stroking teeth on the metal post), with a high variability among individuals; these observed behaviors might be included into the category of redirected behaviors.

In C2 stereotypes and abnormal behaviors were observed both during pre-meal and rest. The behaviors observed were weaving; kicking/striking door-box; wood chewing; repetitive licking. Among these the relative greatest amount was: wood chewing/repetitive licking (see fig 8.4), followed by kicking/striking door-box and pacing; weaving. The stereotypic/abnormal behaviors were statistically negatively correlated to feeding behaviors, rank (R=-0,5) and positively to the split behaviors (R=0,567) and to the total standing time (R=0,651) (Pearson) (P<0,01).

Fig. 8.4 : ***Stereotypic/Abnormal oral activities: a performer …and signs, left on a wood wall.***

These data seems to reflect some deficiencies in the management routine, particularly related to the feeding management (low availability of forage reflected by the lowest time feeding) and with social deprivations (lack of possibility to perform normal social behaviors reflected by the higher prevalence of split behaviors) and spatial deprivations (individual bare paddock of small size). The data are in agreement with previous observations of other Authors, reporting an increased time spent standing restless, and abnormal social behaviors among stereotypic horses (Flanninghan *et al.,* 2002). Abnormal social behaviors (with increased aggressions) and an increased amount of time spent standing, joint to an exponentially increased movement, have been reported in others studies of animals kept in social/forage/cognitive deprivations (Benhajali *et al.,* 2008).

CONCLUSIONS of ethological evaluations during pre-meal/rest:

In conclusion it seems that within **C2** horses were generally less active (more standing and more standing not drowsy; less movements and less feeding/maintenance behaviors), appearing more apathetic and "switched off", even if, as concerns their reactivity, more alert, and less drowsy-standing than C1, were performed, therefore horses did spend great percentage of their time budget without neither doing any particular activity nor sleeping. Above all the most accurate behavioral symptom of difficulty in their coping is the evidence

of stereotypic and abnormal behaviors, that, as revealed by their quality and their quantity, are related to some management deficiencies (low roughage availability; social/cognitive/spatial deprivations related to the type of stabling practices).

Within **C3** horses seem to be more restless, moving and performing more alerts. They didn't perform any social behaviors (apparently) and within the standing the ratio drowsy/not drowsy was more similar to C2 (more time spent not doing nothing), anyway they probably had some social involvement with paddock neighbors: even if they couldn't touch each other they did watch, smell, call each other. Moreover apparently their motivation to the movement seems to be related to social needs (among the observed movements they spent more time walking at the edge of their yard watching, the neighbours, even if the corridor prevent them touching each other). On the contrary the main motivation to movement within C1 and C2 seems to be related to frustration, while waiting for food (redirected behavior), in fact while within C1 and C2 the relative amount of movement was higher during pre-meal circumstance, within C3 it was higher during rest circumstance. In C3 in fact often horses stopped eating and move towards the edge of their yard.

It seems that in **C1** horses had the possibility to perform a more varied behavioral repertoire (different strategies available to cope with possible stressors); they were more active (less standing), less reactive, more socially cohesive.

8.4. ETHOLOGICAL EVALUATIONS DURING THERAPEUTIC ACTIVITIES

The data collected confirmed previous evaluations concerning the horses' different reactivity and reactive balance among the centers, indicating a significant higher alert frequency in C3 ($P<0,05$).

In C3 horses seem to be quantitatively more reactive (more alert frequency), however the degree of increase in alert frequency (comparison of alert frequency between rest and job) was higher in C2 (4X) than in C3 (3X);

Fig. 8.5: ***Drowsy attitude of one subject while child and technicians clean its feet (notice the ear turned toward humans and a slight tension of the nostril)***

moreover in C2 the quality of reactions was different having been recorded 4 sudden flights (none was detected in C3).

It seems therefore that even if the frequency of alert is greater in C3 its quality is greater **in <u>C2</u>**, and above all greater is the **sudden variation in apparent emotional aptitude** (noticed also during rest when horses spent much more time standing and not performing any apparent behavior and did suddenly change their disposition performing alert behaviors, whereas in C3 the horses seemed to be more "constantly" active an reactive).

Within **C1** the alert frequency during job was the lowest, while their "drowsy attitude is the highest".

The **total amount of dispersive behaviors** seems to confirm the evaluations done about the lack of social attitude in **<u>C2</u>**. Noteworthy aggressive behaviors were higher also towards humans.

Anyway it must be noticed that in C3 we did not observe aggressive behaviors towards con-specifics, cause the technicians do not create any occasion of social contact among horses, being frightened by possible incidents among horses (having been victim of an important incident some years ago).

The lowest amount of frustration-conflict observed within **<u>C1</u>** (compared to C2 and C3), and the decrease of self directed behaviors (compared to their rest-observations) might indicate a **positive coping** of horses in C1.

On the contrary **in <u>C2 and C3</u>** the previous considerations concerning horses' alert quantity/quality and social attitude; the **higher level of frustration-conflict** recorded; the increase in **self directed behaviors** (compared to

rest/pre-meal) seems to indicate some **more difficulty in their coping with the job demands**. Moreover the statement of the TR responsible about the unreliability of two subjects (that therefore were not used during our observation-period) seems to confirm this statement.

However the general compliance of horses and their **friendly attitude** towards humans seems to take different positions, since more friendliness was recorded **within C2 and C3** than within **C1.** This data might be explained by the fact that in C1 instructors did not give any food reward to the horses, neither they let the child use food reinforcements, while, particularly in C2, alimentary rewards were often fed during job. Anyway this explanation might not to be exhaustive. Moreover it might be related to the peculiar past of C1 horses (rescued horses) and, perhaps, to their different size (being much more small might perceive or having experienced human's actions as more invasive); anyway the degree (quantity and quality) of aggressive behaviors towards humans was much more worrying within C2 (we observed one bite to one technicians and several serious threats) compared to C3 and C1.

A **general high level of non compliant behaviors was detected during job within all the three centers** (having been refusing stand and push the highest categories recorded, followed by unrequested stop, head lowering and nibbling/nipping with lips).

The compliance of animals was quite homogeneous among C1 and C2, being slightly lower in C3. This latter data did not seem to be related to the evaluations done about the possible different coping strategies performed among the centers.

CONCLUSIONS of ethological evaluations during job:

In conclusion it seems that the behavior during job overlaps with observations done during rest/pre-meal.

The greater level of reactivity seems to belong to C3 as concerns its quantity, to C2 as concerns its quality (sudden intensity-variation).

The higher reactivity, the higher level of frustration/conflict and self directed behaviors, the higher level of aggressive behaviors towards humans (and

towards horses only for C2) seems indicate some difficulties in the coping with job demands within C2 and C3 (compared to C1).
However the friendly attitude is higher within these centers too.
The general compliance of horses seems to follow others trends, respect that of the above mentioned behaviors, being quite homogeneous among C1 and C2, and slightly higher within C3.

8.5. PHYSIOLOGICAL PARAMETERS (HRV; HR;)

Discussing heart measures we would first premise that, in our opinion this variable should be *one* of the measures of animal welfare and of animal's positive coping; but this approach should be joint to different evaluations, including both quantitative and qualitative parameters. The data concerning this physiological variable might represent one of the possible key of lecture of animal welfare, but they do not have absolute value.
Moreover regarding the accuracy of the methodic it should be signaled the occurrence of artifacts (due to the movement of the electrodes on the mobile equine's skin or to muscular contraction during walk); even if a visual inspection was conducted (aimed to the manual removal of artifacts) this procedure might not be effective and sensitive, and this might affect the reliability of the whole methodic.
This methodic failure merits to be signaled, as others Authors do not generally reported it, nor did generally signal the total percentage of data selected and rejected (only a few of them reported this data).
Considering the individuals response to the job (see tab. 7.12 and tab 8.2) (through the comparison of basal and job values) it seems that the effect of job was significant to all the horses, except for horse 6 and horse 7 (C2).
The evaluation of the trend of this effect seems to indicate that horse 1 and horse 4 had positive variations (lower average heart frequency and higher average heart variability respect their basal).
The first horse is a rescued pony, and the responsible of the center referred that in its past he did experience several cruelties and ill-treats; moreover it was reported to be really shy and introversive. Therefore we believe that the

simple presence of the experimenter and the procedures related to the heart measuring might have caused to the animal more stress than the job; moreover these findings seems also to indicate a good relationship established by the handlers with the horse. It seems to be confirmed from the behavioral observation during the job (low number of frustration-conflict, self directed, aggressive behaviors) (see synoptic table: job-heart-effect/job-behaviors). These data taken together seems to reflect the positive coping of the animal within job situation.

Horse 4 is the elder horse of C2, the behavioral observations seems to confirm the general good response to job, since the frequency of frustration conflict and self directed behaviors was lower than others horses, as were lower aggressive behaviors.

As concerns the others horses it seems that the main negative effect of job was in horse 9, followed by horse 10, horse 3, horse 8, horse 5 and horse 2.

As concern horse 9 he seems to be the most affected from job, as confirmed also from behavioral observations (particularly concerning frustration/conflict behaviors).

The evaluation of behavioral observations (tab. 8.2) shows that the behavioral category that generally did mirror the heart parameters was *frustration/conflict* (since, whereas this category has had high frequency, horses have had higher variation in the heart parameters at job).

Moreover the compared evaluation (among individuals) of behaviors during job seems highlight that, while within C2 the most "affected" individuals (concerning the heart parameters) did react less, within C3 their reaction was higher, such as the frequency of non compliant behaviors. It seems to confirm the consideration done about behaviors evaluation (both at job and at rest):

if a deviation from normal behaviors is found, it seems to go within C2 towards hypo reactivity and a sort of "apathy" (the horses that had the most clear heart-effect by the job were less reactive and did perform also less not compliant behaviors than C3 or others horses within C2); while in C3 this potential deviation went towards an hyper-reactivity (more alert, and also more non compliant behaviors)

The horses that did not show significant heart-effect arising from the job are the younger horses of the center, even if for one of them (horse 7) the number of frustration/conflict behaviors were quite high, it did not affect heart parameters; probably this individuals (more young and sensible than the others) did respond to the new job and to its constraints, finding anyway an emotional balance and a positive coping.

	horse	Degree of job "negative" effect on HRV (reduction in HRV). Numbers go from the greatest (1) to the lowest (6) negative effect observed.	FRUSTRATION -CONFLICT	SELF DIRECTED BEHAVIORS	SEEKING HUMANN CONTACT	HOSTILITY TOWARDS HUMAN handler	HOSTILITY TOWARDS HUMNA child	THREATS TOWARDS EQUINE	AGGRESSIVE TOWARDS EQUINE	NON COMPLIANT BEHAVIORS	ALERT	DROWSY
C 1	1	Positive effect	4,62	0,0	0,0	1,5	0,0	0,7	0,0	19,9	0,0	6,1
	2	6	4,25	0,0	1,4	0,5	0,0	0,9	0,0	6,1	0,4	4,7
C 2	3	3	35,6	0,7	1,0	8,7	1,7	9,1	0,7	5,3	1,7	0,0
	4	Positive effect	12,4	0,0	10,9	0,0	0,0	0,7	0,0	12,45	7,9	4,1
	5	5	31,6	4,5	1,5	1,5	0,0	1,9	0,0	10,6	14,4	0,0
	6	No significant effect	11,2	2,4	5,5	3,7	0,0	5,5	0,0	20,8	8,6	8,6
	7	No significant effect	32,4	0,4	6,8	2,8	5,2	7,2	0,0	18,4	11,2	0,0
C 3	8	4	26,1	0,6	0,6	2,2	0,0	X	X	16,1	20,0	3,3
	9	1	26,4	0,0	1,6	0,5	0,5	X	X	13,3	9,6	4,8
	10	2	36,0	3,2	13,6	0,0	0,0	X	X	21,6	9,6	0,8

Tab. 8.2: ***Synoptic table "Job-Heart-Effect/Job-Behaviors".***
The table reports possible correlations between job effect (on heart rate variability) and performed behaviors. Yellow marked the significantly negatively affected horses (P<0,05); green marked the significantly positively affected horses(P<0,05).Grey marked the common trend in frustration/conflict behaviors within negatively affected horses. Blue and pink marked the distinctive behaviors frequency between the two different centers: higher aggressive behaviors and lower alert and non compliant behaviors in C2; higher non compliant and alert in C3.

Within C1 horses did anyway show the best responses to the job, one being "positively" affected and the other being the less affected, among those horses that did show a significant effect.

8.6. HANDLING TASK:

This test was experimented to get some more analytical evaluations of the whole net of factors acting towards horses, included their relationship with humans.

The test clearly shown some difficulties among the technicians.

The most problematic aspect during handling was the use of body language, and particularly the aware and consistent use of body position; many difficulties were observed also in the effective use of the hands and of the voice.

Technicians did often show a lack or a confused awareness of the stimuli applied, and poor timing, intensity and innovation in their use. Moreover, while some of them were often over-used (inconsistently), as for example the use of hands and the continuously touching the horse, others useful stimuli, such as the voice, were generally under/mis-used.

These findings seem to be related to the relatively high level of non compliant behaviors observed and the differences in the scores obtained within each center seems to be related to the different frequency of non compliant behaviors observed within each center: in fact where the handling had lower scores the non compliant behaviors were also more frequents.

Moreover it is likely that the better handling have had positive effects on the horses within C2, in fact in spite of the evaluated deficiencies concerning their husbandry (and the following anomalies time budget) some of the horses in C2 had better results, concerning the heart parameters (compared to horses kept in C3). Anyway, as already said not just quantitative but also qualitative outcomes should be evaluated to have a complete assessment of animal welfare.

These results might confirm the validity of this methodic concerning the assessment of the horse/handler relationship and concerning possible analytical ways to find out what is critical to the human-horse relationship and, eventually, to settle targeted, effective and accurate educative interventions (for the personnel working with horses).

Our results might confirm the empirical observations of others Authors that did show a tendency for the trainers to use more negative reinforcements (learning to perform a behavior in order to avoid a disliked stimulus) (Nicol, 2005; Goodwin *et al*., 2009) (e.g. the use of pressure by the leading reins) and punishments (use of an aversive stimulus to inhibit a behavior), while paying little attention to positive reinforcement (Waran and Casey, 2005). Our findings are in agreement with scientific and empirical evaluations that have been conducted in the last years, and did highlight a confusing use of reinforcement (ineffective rewards, lack of clarity of orders, poor timing) that causes a state of learnt helplessness and lack of control in the horse and might induce confusions and lead to neurotic behaviors (Kiley-Worthington, 1997; Hausberger, 2008).

Correct handling procedures can lower reactivity levels in horses and may facilitate learning (Nicol, 2002); moreover interactive/cooperative teaching, similar to that used for preverbal infants, has been demonstrated could be successful in facilitating learning some verbal cues in horses (Kiley-Worthington, 2009; Sankey *et al.,* 2010). The implications of a correct handling might therefore be relevant for handling and teaching, enhancing the efficacy of training tasks and empowering the benefits arising from the human-horse bond.

However the main difficulty in this area is to access the field situations, and above all to settle practical measures and interventions aimed to effectively improve the relationship in practice.

Technicians generally do not have to perform teaching tasks with the horses, but a basic knowledge of learning theory, and an improvement in the ability of observing the horse seems to be generally necessary.
In fact day by day, as found out also through our enquiry, TR horses are under chronic stressors (mainly relational, but also joint to the repetitiveness, constrictiveness, lack of cognitive stimulation to the horse, that often characterize TR setting). The handler that every day uses the horse should constitute a resource, instead being a further problem to the horse.
The bond with the technicians might therefore be a font of emotional balance for the horse, and help the horse in a positive coping. Technicians may, if well trained, to enrich the life of horses, offering to the horse an important cognitive and social stimulation (that as seen is generally the first lack within TR environmental conditions).
Moreover the good relationship of the technicians, enhancing the compliance of horses and their relational positive attitude might not only represent an important prevention of dangerous incidents, but might also increase their own satisfaction (preventing their burning out), and above all might improve the results of the therapeutic and educative interventions.

8.7. THE SCHOOLS-PROJECT

The project evaluated, being a field study couldn't include a control group neither a strictly standardized procedures. However the results reported by the teacher, compared to the previous years (when the child attended a "traditional" TR activity) could be a good control parameter.
An approach to TR activities consistent with equine social-behavioral characteristics and aware of the complexity of human-horse relationship would guarantee a complete fruition of its beneficial effects. Moreover this kind of approach implies the great advantage to involve a great amount of children (being its costs comparatively low with respect to more traditional therapeutic riding activities); nevertheless its social consequences seems to be extremely relevant in the current days.

Questionnaires show that, despite their generally good disposition towards animals and assisted intervention, teachers have not yet clarity concerning it; it seems that they are still tied to stereotyped ideas concerning the equine essence and relational worthiness. Positive effect has been highlighted in relation to the enhancement of teacher's and children's knowledge about horse (horses' communication, social structure and dynamic, their true motivations and needs).

Although activities have shown good potentiality, the permanence of possible social and behavioral positive effects in relational dynamics among children was reported to be inconstant. Probably this fact should be related to activities' briefness and to the different level of teachers' involvement (some did spontaneously caught the cues offered by the project while others didn't show the same enthusiastic participation).

Approval level has been high both by teachers and children and the results have been over teachers' expectation. Nevertheless logistical difficulties have been highlighted by teachers that wished a longer time-period for each activity (planning, implementation, elaboration appointments).

Data collected converged on the importance of teacher's compliance to enhance effectiveness of this interventions: whereas the interest and disposition of teacher has been high (towards the project and the animals) children shown better results with regard to their involvement during activities and to its social and behavioral effects.

Even if these data show that ethological concepts could empower beneficial effects of horse assisted activities, they represent an early study experience that still needs to be deepened by further experimental studies. Some further experimental evaluations, specifically concerning horse welfare might help in the "global" evaluation of the project. The Center where the project was conducted was not included in the experimental group, but some evaluation concerning horse welfare can be deducted through the enquiry (13 technicians and the president of the center participated to our enquiry and they filled the questionnaires, having been reported as "center5").

The most sensitive data on this regard is the longevity index of the center: 66% of the horses are in the center since more than 10 years, notwithstanding the ratio users/horses (and therefore the amount of job to the horses) is the highest in absolute (23,3). The horses spend the longest time out (paddock) and have possibility to perform their normal social behavior (average time spent in paddock, within a 6 horses' group, was 72 h/week); moreover structured and constant training and screening of the animals is settled by one technician that is the responsible of animal welfare.

These synthetic data seems to represent an accurate feedback, concerning the welfare of the animals involved in the discussed project.

The approach evaluated attain to the third and last order of aims of our research: evaluation of the possible improvement in AAA/TAA' effectiveness, through a full access to the relationship with horses.

In conclusion the results reported seem to confirm the possibility of such improvement and, at the same time, also its effectiveness concerning equine welfare.

9. OVERALL DISCUSSION:

The evaluation of animal welfare requires a comprehensive approach, and the acknowledgement of the whole net of reciprocal and varying stimuli acting towards the animal, humans included.

The questions we tried to answer concerned the possibility of a reciprocal (to the horse and to the human) life enrichment, arisen from the active and participated involvement of horses, within structured interventions (TR).

Given the complexity of the question we settled several different approaches (each addressing some different aspect), that taken together led to the whole result. We will discuss now the overall result.

The enquiry conducted among the center uncovered the complexity of the human social environment of TR, and revealed critical and strength points, concerning equine welfare and concerning the emotional experienced of TR personnel.

TR Technicians demonstrated a great interest towards horse, and a general good predisposition, sensibility attention to the *others* in general (horse included); many of them consider the horse as a "colleague" rather than a tool, and one of their most important motivation to choice this job was their great passion and love towards horse.

However in spite of these premise some data emerged through the questionnaires that highlighted an anthropocentric approach, and a lack of awareness of the best strategies aimed to help the positive coping of horses, particularly concerning the fundamental importance of husbandry methodic aimed to animal welfare. Moreover conflicting emotions and ideas, concerning the ethic of horses' involvement (general negative ideas concerning the outcomes of this job to the horse, notwithstanding poor welfare is not explicitly declared), and some objective parameters of difficulties in the relationship, might undermine the goals' achievement of the interventions and might cause the burning out of the TR personnel.

The further experimental procedures within the three centers did confirm the results of the questionnaires.

The interest and the collaboration demonstrated by the technicians to the research did confirm their genuine attitude towards horse; the questions they posed and their explicit declarations did highlight their interest in furthering their knowledge, and (by many of them) their desire and need in increasing their horse-related skills, through specifics and structured educative purposes.

The behavioral evaluations of horses did show a net difference among the Centers that might be conducted firstly to deficiencies in the husbandry methodic, even if the individuals' history/past experiences and a lack of appropriate selection of the animals might have had some influence as well.
Anyway the evaluations of both behavioral and physiological parameters did show a net trend within each center.

In C1 horses did generally had a natural time budget, they performed a varied behavioral repertoire and different coping strategies towards the demands of their more complex physical and social environment; they had the possibility to make choices and to have control over part of their own lives. They were more active (less standing), less reactive, more socially cohesive.
Their coping with the job demands was positive.

In C2 horses were generally less active (more standing and more standing not drowsy; less movements and less feeding/maintenance behaviors), appearing more apathetic and "switched off", horses did spend great percentage of their time budget without neither doing any particular activity nor sleeping. Their social behaviors were mainly based on aggressive performances, that were also more "serious" (since more aggressions than threats were performed).
On the contrary within C3 horses appeared to be much more reactive, more restless, moving and performing more alerts; their time budget and behavioral repertoire during rest did not significantly differ from C1 concerning some behaviors (particularly movement and time spent feeding), while it did significantly differ from C1 *within* the total time spent standing (more time

spent standing "doing nothing") and in the impossibility to perform normal social behaviors.

Above all the most accurate behavioral symptom of difficulty in horses' coping is the evidence of stereotypic and abnormal behaviors.

In C2 these anomalies, in their quantity (statistically significant correlation was demonstrated) and in their quality, were related to some management deficiencies (low roughage availability; social/cognitive/spatial deprivations). The fore mentioned apathetic/hypo reactive attitude was generally observed also during the job.

2 of the horses were explicitly declared being *problematic and inapt to the job,* and they were therefore excluded from TR in that period (hence we couldn't add their job-behavioral evaluation). In the comparison of the centers, this fact should be evaluated per se as partial result (indicating some adaptive difficulties).

Investigating the individuals responses during the job a significant difference was detected among the horses within this Center (C2). In fact physiological parameters indicated one of the horses as "positively affected" by the job (the elder horse of the center); two of them did not demonstrate significant variation between job and rest, two horses did demonstrate, both behaviorally (more frustration conflict and more aggressive behaviors) and physiologically (increased heart rate and decreased heart rate variability), to be negatively affected by the TR job.

In every center the horses more affected by the job did perform more conflict behaviors.

The reactivity during job did confirm the same trend observed during rest, re-presenting the opposite tendencies between C2 and C3 as concerns the reactivity. In fact wile in C2 "worst" (more negatively affected by the job) horses were those horses that did perform less alert and less non compliant behaviors, in C3 all the horses (all classified as "negatively affected"), were significantly more reactive (significant higher frequency of alert) and did perform more non compliant behaviors.

These observations as said are in agreement with the general trend observed out of job context among the groups.
However it is important highlight also a qualitative strong difference among the centers, particularly concerning aggressive behaviors performed, and concerning the reactivity of the horses. In fact, to the global evaluation of the equine welfare (and of its possible outcomes to the humans), the different intensity of threats (that in one case was a real "bite-aggression" towards the handler) and the different intensity of reactivity (4 sudden flights were observed) observed in C2 are important aspects to be taken into account.

The experimented "handling task", aimed to the analytical evaluation of the horses-technicians' relationship, did demonstrate to be a possible approach to analyze this topic.
The test demonstrated its efficacy in the detection of several critical aspect of the handling; the technicians did show particularly difficulties: in the effective and intentional use of the communication towards the horse; in the appropriate use of all the possible stimuli and in their correct timing.
The test efficacy was demonstrated by the apparent correlation of the scores obtained by each center to the number of non compliant behaviors performed by the horses at job.
Even if the low accuracy of the measures might be criticized, the main merit of the test is to represent the first attempt to analyze (the more objectively as possible) the handler, within a structured situation and through analytical items. This is the first and necessary step, if it is to settle targeted educational interventions for the "horse-people" in general, and by this improve their relationship with the horses.
The quality of the handling in fact might represent one further chronicle stressors, to TR horses. This negative factor, in addition to others (particularly the lack/inadequacy of cognitive, social, physical stimuli and the constrictiveness of many performed activities) might negatively affect horse welfare. Better handling might have considerable positive effects on the

compliance of the horse and represent a strength point towards intrinsic stressors of the TR job.

This was demonstrated by the different results of the handling tasks within each center. It is likely that the better handling did have positive effects on the response of the horses within C2, and may explain why, even if many serious behavioral symptoms were observed (both during rest and job), during the job three of the evaluated subjects seemed not to be negatively affected by the job solicitations (at least not as concerns the physiological parameters).

Probably also individuals positive aptitudes (due to their innate tendencies and to past experiences) might have important influences on the coping of the horses.

Even if the quality of the handling (as index of the quality of human-horse relationship) is an important factor, our research did demonstrate that first of all the husbandry of the horses is of primary importance to the horses' welfare and to their positive coping within some intrinsically negative TR characteristics (as confirmed by the qualitative-quantitative different seriousness of the behavioral parameters, at rest and at job).

In agreement with the modern studies of equine welfare, the most important factor that affected the evaluated horses was the social environment (possibility to have free contact with others horses and to form constant and mixed groups), the availability of roughage food, the inadequacy of space, the lack of cognitive stimulations.

Moreover, specific of TR context, was the abnormal social inter-specific stimulations.

In this sense the quality of the relationship with the technicians is an important and underestimated factor, as practical cognitive-emotional-social enrichment to the horses.

Specifically settling the management/husbandry of the horses (instead just following the traditionalism/ habits or the human convenience) might not only enhance the welfare and positive coping of the animals involved, but also increase their compliance and their active involvement in strong positive inter-specific relationships.

Besides being an important ethical, safety, economical topic, these concepts might also represent a possible guide line for new methodologies (the "ethological" methodology) in the planning and in the accomplishment of therapeutic and educative interventions. The Schools-project, an "ethologically fitted" project (fig 9.1) did confirm the possibility to settle strategies aimed both to the animal welfare and to the complete fruition of the beneficial effects to the children.

The attempt to put oneself in the horse's point of view and to address comprehensively the topic of animal welfare might therefore enrich the lives of humans and animals.

Fig.9.1: ***Schools-Project: children-horse interaction***

10. CONCLUSIONS:

In conclusion our comprehensive approach did demonstrate some result in agreement with scientific background (as concerns equine welfare and its fundamental topics) and found out also some original result, related to TR context and to human-horse relationship in general.

In fact, even if others Authors did approach the subject of the welfare of TR horses, their limit was, probably, that they their investigations addressed only *one* circumstance of the whole equine life (the job session).

On the contrary our efforts addressed, more comprehensively as possible, the whole broad of inputs (physical, social, cognitive and emotional environment) and outputs (behavioral and physiological) that altogether contribute to the animal welfare.

Our approach, and particularly its original methodololgies (the questionnaires and the "handling task") did demonstrate to be effective to analyze what might affect the positive coping and the active and positive horses' involvement, within structured educative/rehabilitative interventions.

Our enquiry did show a lack of clarity and definition of the most effective animals' management (husbandry, initial and periodical training *etc.*) and concerning the most safe and most effective relational modality (within technicians'-horse relationship).

Our evaluations represent a first effort to globally evaluate the subject of human-horse relationship, that probably need to be better defined in many aspects; our preliminary findings should be furthered and implemented.

However, besides their theoretical repercussion, we believe that the most important repercussion of our results might be practical.

In fact our conclusions might constitute an useful guide-line, a tool to settle more univocal procedures and standards aimed to:

- the preliminary evaluations of the centers (through the questionnaires specifically ideated);

- the screening of the horses (through our behavioral schedules, that might be simplified and used by appositely trained TR personnel);
- the analytical evaluations of the human-horse relationship (through the "handling task";
- the accomplishment of educational programs targeted to TR personnel and aimed to improve and comply their knowledge/skills, concerning the most effective husbandry methodic, and the most effective handling and relational methodic.

Moreover, as seen in the described horse-assisted intervention (Schools-Project), the educative intervention addressed to the technicians might contribute to find out new educative/rehabilitative methodic; and therefore might make really available the whole potentialities of equines to humans.

Perhaps one more step is done, towards the "reciprocal life enrichment" arising from our bond with a *so different* being.

Fig. 10.2: ***Interacting with "other"= life enrichment***

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